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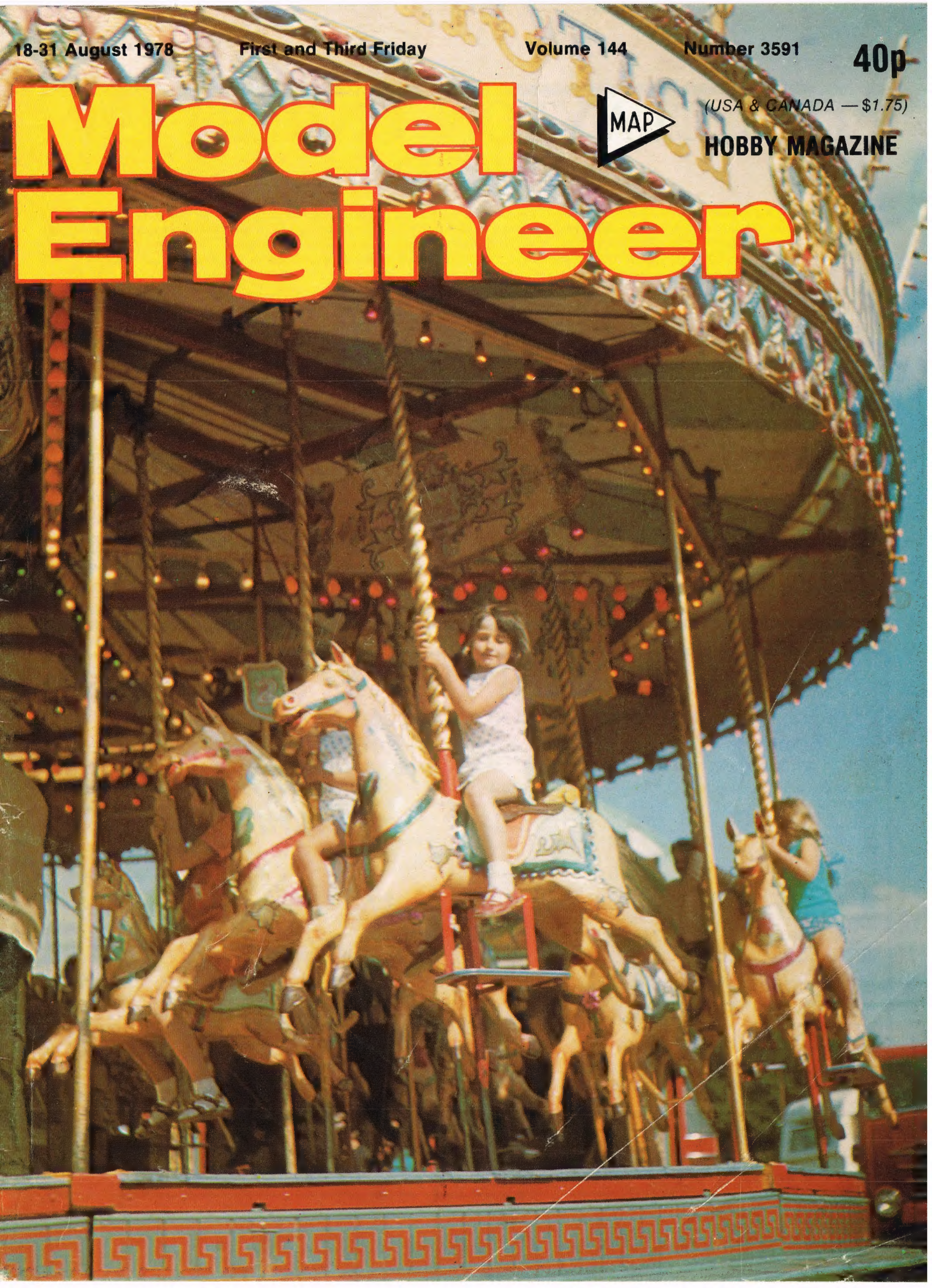

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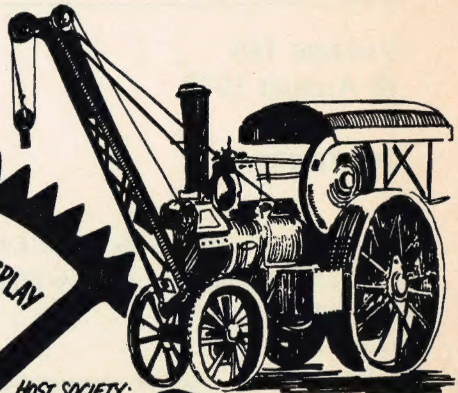

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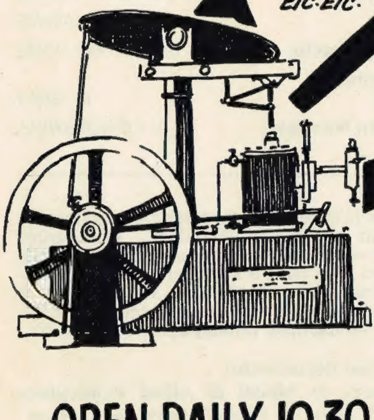

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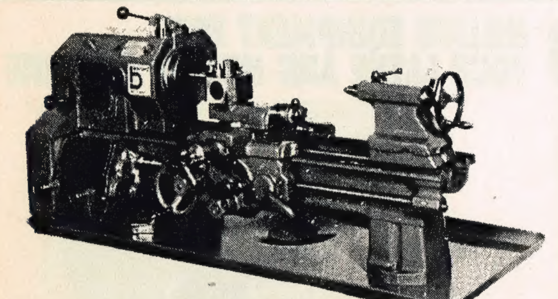

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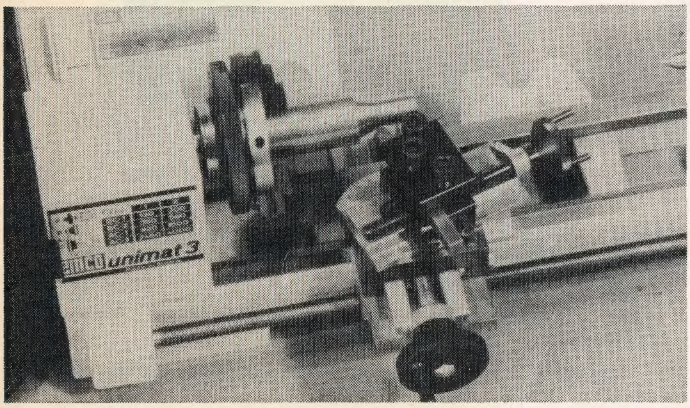

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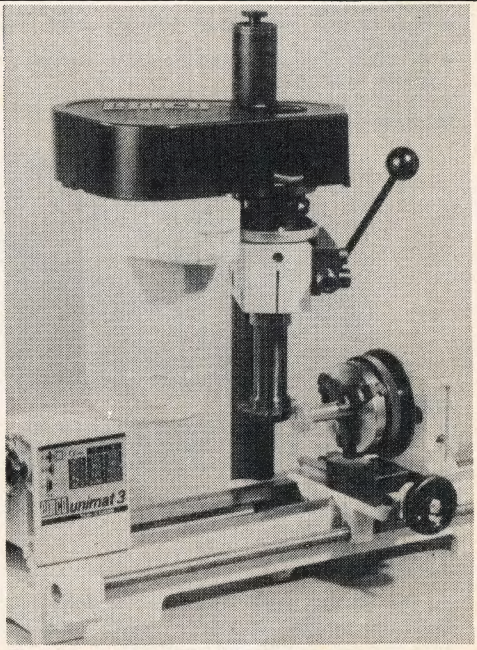

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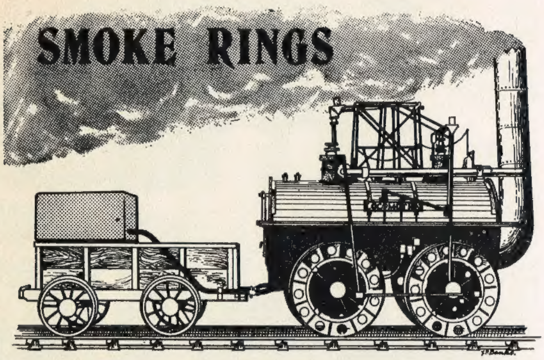


A Commentary by the Editor

The eleventh IMLEC

There is more to an international loco meeting than trying to find the most efficient loco and driver. Martin Evans, in his presentation speech, referred to a gathering of the clans and this is surely what it is. But like any one-day event the distances involved tend to discourage entrants from the other end of the country. Nevertheless, while the fifteen competitors at Guildford on 9 July were coping one way or another with the intricacies of the circuit, I was enjoying conversations with *Model Engineer* readers from far and wide. Some, from far afield, had up to then been just names — Charles Cormack of New Zealand, Bert Kirby of Australia, Jack Love from South Africa, to name but three. From nearer home there were so many names that I'm afraid my memory is just not up to recalling them all, including the visitor from Northumberland who admitted to sneaking out of his house in the early hours, while his wife and children were still asleep, to travel to Guildford. I'm sorry I cannot recall your name sir, but I am very pleased to have met you.

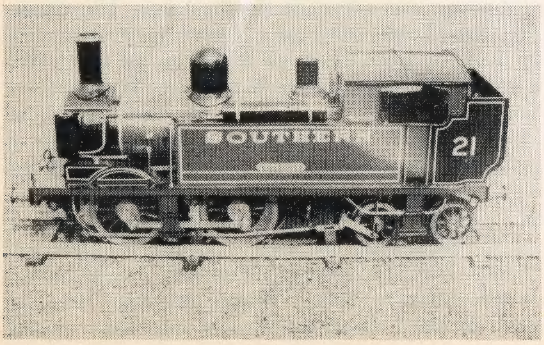
I do, however, recall the meeting with the Bristol chaps though and the topic of conversation was quite naturally on next year's IMLEC. Club members who have visited Bristol track will know that it is ideal for these competitions and the club expressed its wishes that the 11th IMLEC be held there next year. They have also taken me up on my suggestion that it be a two-day event with facilities arranged for visitors to camp overnight if they do not wish to stay in a hotel. It is too early to say whether this will be a definite thing as there are, of course, many other facts to be taken into consideration, not the least being the need to obtain local council permission. But the facilities are there in this most attractive site and if all goes according to plan next year will see a much larger entry — possibly with two separate competitions for 3½ and 5 in. gauges if the number in each scale justifies it. There will also be, I hope, a barbecue and night run on the Saturday night which may encourage visitors who would otherwise not be interested in the competitive aspect. If our friends in the U.S.A., Canada, Australia, New Zealand, Japan and other countries can make a week-end of it, why shouldn't we?

Well, that's the plan and I hope it will reach maturity. The dates are not yet fixed although early July seems a convenient time. I will be meeting with the Bristol officials shortly and when further details have been worked out, I will publish them in these columns. Meanwhile, I would like to hear from readers who would support such a meeting so that we will have some idea of what to expect.

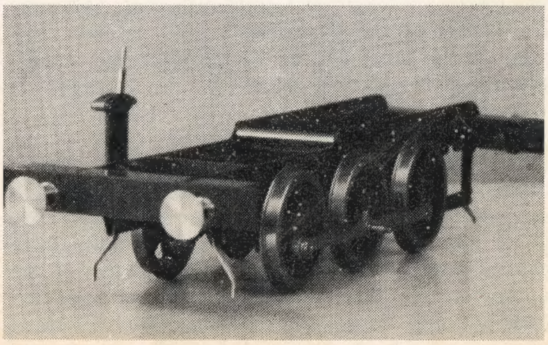
CLAUDE REEVE

As we closed for press, we were saddened to receive news of the recent death of Claude B. Reeve, who will have been well known to many of you for his many fine clocks and articles for Model Engineer as Technical Consultant. An appreciation of him by John B. Eastwood appears on a later page in this issue, and there will be an obituary by Martin Evans in our next issue.

Mr. P. H. Lewis of Norwich sent us this photo of his I.O.W. 5 in. loco to Don Young's design.



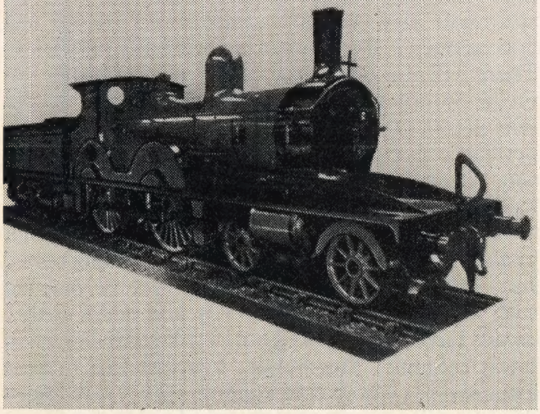
Mr. C. T. Foster of St. Albans made this Rob Roy chassis. He had little engineering experience previously.



1978

IMLEC

GUILDFORD



Winner, P. Wood, of Chingford, receives the award.

reported by D. E. Lawrence

THE POPULARITY of this Competition continues unabated; attendance at the 10th one was good and, in spite of poor weather in the morning, the crowd steadily built up during the day. The Guildford M.E.S. are old hands at putting on large shows, their Exhibition is an annual event for them, and their tried and trusted organisation under Chairman Alan Jensen was pretty good. I went to one of their pre-IMLEC meetings and found that most aspects had been covered thoroughly, in fact they were able to deal with IMLEC and Exhibition business at that meeting. The Competition had not been advertised locally as it was felt that this was a model engineers' day not for the general public who would be welcomed at their Exhibition the following week-end.

There was a large marquee about 20 ft by 40 ft erected, in one end of which was the refreshment bar where a team of the Guildford ladies, under the leadership of the Chairman's wife, served non-stop; in the other end of the marquee was a good display of locomotive models by the members. A well produced programme was on sale and it included details of the Competition, map of the track with gradients shown, past winners, suitable advertising matter, the specimen formulae used for calculating the results and a "score-board". The usual p.a. system was installed and, in addition to the normal sort of announcements, details of the competing locomotives were given. An area had been specially set aside for photographers in one of the loops inside the track perimeter, but this was never really crowded because a great deal of the action (or perhaps in-action), as became apparent during the runs, was elsewhere.

Their portable track was laid down inside the main track and kiddies were given rides there; passengers on the competitors' trains were mostly confined to adults from supporting clubs. The Society's own locomotive 5 in. gauge 4-6-4T *Taurus*, was in operation all day on the portable track. The Club's 00 gauge layout was in use in part of the clubhouse and, outside on the grassed area, was a large 0 gauge layout as an added item of interest. The Southern Federation attended in force and they had a separate small marquee for the use of visitors and Federation Officers.

Hospitality was much in evidence, the hosts gave free lunches to the competitors and part of the clubhouse was set aside for their use. The Chairman most kindly gave me a bottle of very nice wine to help my own lunch go down on its way! Wilf Carter, a President of the Witney and West Oxford Society for some years, and a very hospitable fellow, stopped by and unloaded a couple of cans of good ale on the basis of having brought them all the way, he was not going to take them back! And Gillie Potter, an enthusiastic photographer of live steam, presented me with a couple of personal photos. Jack Love presented me with a large packet of photostats of South African Railways diagram book so that I would know what they were talking

THE TENTH INTERNATIONAL MODEL LOCOMOTIVE EFFICIENCY COMPETITION 1978

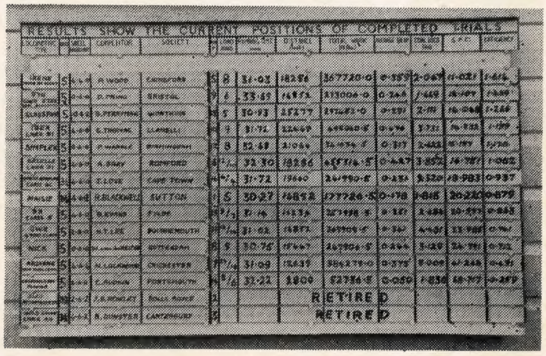
about. Very embarassing all this attention — well sometimes!

There was, as we might expect, co-operation between clubs and assistance from other sources such as: Birmingham loaned their dynamometer car for use on the trains and Bristol lent their car as a reserve; Chingford M.E.C. lent their results board, this is the one on which the details can be reshuffled so that, as the results of runs are known, the current placings appear in order on the board; Alan Jensen is "somebody" in the C.E.G.B. and that body had evaluated the calorific yield of the coal used in the Competition. Birmingham had recently done up their dynamometer car and Guildford obtained it a little in advance of the day so they could have some dummy runs and get used to the routine. David Neish was in charge of the calculations and responsible for the scoreboard on which the details of the runs were most plainly entered.

The track is 1,406 ft. long and it is difficult to describe accurately without a sketch; it is roughly like an unequal kidney shape with a brutal dent in it somewhat over half way and pulling the entire issue through 90 degrees. This shape results from Guildford enlarging the track recently by taking out one curve and joining it to a new loop. Those who saw the diagram in the programme will appreciate what I mean. Grades are generally reasonable except on two stretches where they increase to 1:84. Some competitors thought the 1:84 in places was not a reliable description and estimated one section as being considerably steeper than that. From observation I would agree with them. Construction is of steel rail, flat section, set on edge and kept to gauge by tie bars and held down on to wooden sleepers and planks set on edge which are fastened to vertical steel pipe piers. The older section of the track has concrete piers. Curves are mostly 60 ft. to 70 ft. radius with a short 50 ft. radius length in one place. An anti-tipping rail, a most necessary safety feature, is being fitted and this is about half completed. Alignment of the rails is fair but I heard a few drivers comment that super-elevation on some curves was not quite what they expected.

There were some minor changes in the Competition Rules and these referred to completing a run, it had to terminate properly at the temporary station, and off-loading of passengers after a run had started. Speed limit on the track was set at a nominal 10 mph, though I fancy judges and observers used what is called their discretion about this. Coal used was anthracite in two graded sizes, which the helpful C.E.G.B. had evaluated as yielding 14,312 BTU/lb.; competitors could choose which size they wanted and it was given to them in lots of two lb. weight. They could have as much charcoal or wood as they liked to raise steam but, when 60 lb. on the gauge was reached, they could start using their weighed allowance of coal. All coal used was debited to the engine. These conditions were much the same as in previous years. Competitors could have water in half-gallon plastic containers passed to them on the run and I noticed that the observer on the dynamometer car car was often used as a back up fireman to pass bags of coal to the driver. A large specially made clock was placed at the starting point to show time elapsed of each run.

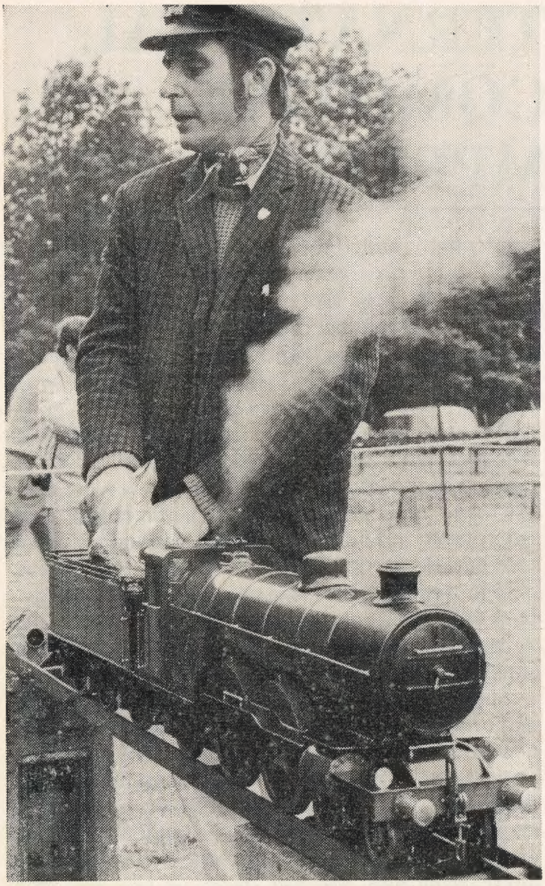
The first run was scheduled to start at 8.45 a.m. and I have to make an apology here for only having a few details about the first entrant. Although I had arrived in good time, it was apparent that Mr. Blackwell was having some difficulty in trying to make a decent coupling for his tender to suit the dynamometer car draw-gear and I refrained from interrupting him. He had steam up and was obviously wasting coal whilst standing. Perhaps the hosts in future could supply relevant information about this to competitors in advance.

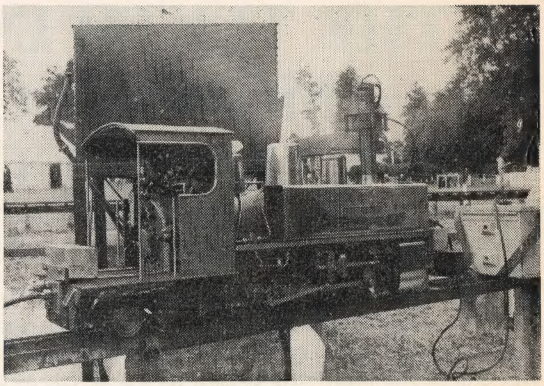


The results board was kept in sequence throughout the competition.

Run No. 1

This *Maisie* was made by Mr. R. Blackwell of the Sutton M.E.C. and first turned its wheels on rails in 1970. The little 3½ in. gauge *Atlantic* was built to LBSC's words and music except for the





lubricator drive and has been used regularly for club work at Sutton.

Load for the run was driver, observer plus 3 passengers two of whom were boys; the driver made a careful start. Weather conditions were decidedly gloomy and rain threatened any moment but fortunately held off. Speed was fairly steady around 6 to 7 m.p.h. and the driver had matters well under control except for frequent escape of steam from the safety valves. The engine had a clear sharp exhaust and had no trouble in taking its load. It was a nice clean run and I think *Maisie* did well to finish in 7th place.

Run No. 2

All the 3½ in. gauge locomotives were scheduled to run before the 5 in. gauge engines; perhaps a gentle appreciation of the larger brethren's reputation for spreading oil and water on the 3½ in. gauge rail! John Rowley of Rolls Royce, Glasgow, made the first run ever in the first IMLEC with a freelance 5 in. gauge 2-8-0 and he now re-appeared with a 3½ in. gauge *Mountaineer* to Don Young's basic design. He told me that the valve gear on his engine differed from the design in that it followed the guidance given by Alan Gettings in *M.E.* last year. The suspension is fully compensated throughout. Cylinders are machined from solid cast iron and the aluminium alloy pistons have two rings, slide valves are phosphor bronze. A radiant superheater is fitted and the smoke-box is split or divided along its centre line which is an arrangement I like and have often advocated, it makes for easy assembly and maintenance. Boiler feed is by two Standard No. 1 injectors taking water from a separate tank; Fred Cottam's type of sight feed hydrostatic lubricator for the cylinders is fitted. On both rear and front buffer beams there were placed large blocks of lead for extra adhesive weight.

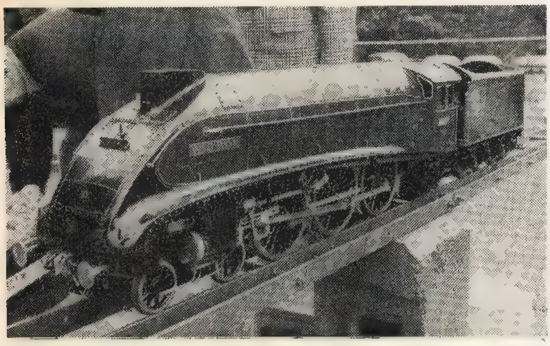
Load was driver, observer plus 8 passengers. Now we come to the bitter bit! The Guildford Society normally run clockwise round their track because the grades are more favourable for engines than the other way. Also, instead of using the normal station as starting point because it is not very convenient for spectators, trains started from a temporary station just behind the traverser from the siding up from the steaming bays and there was no time to settle in a "green" fire because within half a minute the engine is put to the collar to tackle the climb to the summit. Well, John got his *Mountaineer* away to a fair start with some slipping in spite of the lead ballast and then ran down the long reverse curve at a smart pace only to slow down at the foot of the bank. Progress thereafter was somewhat erratic but speed usually fell away up the bank, through the station and evergreen tunnel and under the footbridge which is approximately the summit of the line. About half time the train came to a halt with the blower hard on; there was a lot of slipping at the re-start and *Mountaineer* went slowly for a while then stopped again for about five minutes.

After considering things, John decided to retire his engine; he told me he was getting false readings in the water gauge and had little water in the boiler when he thought it was full. Later he took off the water gauge and when I saw it, one of his troubles

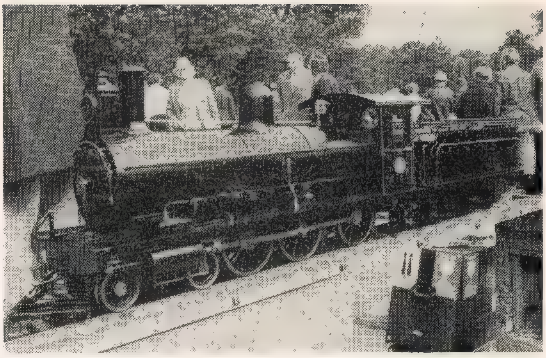
was obvious, the ways through the fitting were smaller than the bore of the glass.

Run No. 3

Ben Dunster of Canterbury was making a second appearance with his 3½ in. gauge LNER A4 Pacific *Wild Swan* and no doubt hoping to improve on his performance of last year. The A4 gained a silver medal at the 1975 M.E. Exhibition and still looked in good condition in spite of three years' use since. Ben has done some maintenance on the engine and re-set the conjugated valve gear and put in new bushes where needed. My question about cylinder size met with some apologies; Ben remembered the bore of the three cylinders was 1⅛in. but the stroke eluded his memory. The steaming bay steward produced a steel tape and we established it was 1¾ in. I pressed no further questions — it is rather difficult to recall that sort of detail which was attended to long ago. As Ben's son was not available to drive the engine, on this occasion the regulator was entrusted to clubmate John Pearson.



Load was driver, observer and 3 passengers. The unfeeling skies had still refrained from emptying themselves on us and on dry rail *Wild Swan* got away with a couple of bouts of slipping. The beats sounded good and the train ran smartly round the reverse curve but gradually came to a stand at the foot of the bank on the west loop. Gentle nudging failed to get things going again and John backed on to the straight and tried again. There was a lot of slipping and the load was reduced by one passenger. A further attempt resulted in the train being set back again and this time the train got going. It looked as though we would now see what the A4 could really do, but as the train completed the first lap at a good speed, the Pacific's leading bogie de-railed; the train was stopped and the bogie put back on the rails. Shortly afterwards a further stop was made and Ben and his driver examined the engine and found that a spring on the bogie had broken and the A4 was retired from the competition.



Run No. 4

The first run by one of the two overseas competitors was by Jack Love's South African Railways Class 6C 4-6-0 which is a good looking model of the 80 years-old prototype. Jack's engine is to 1 in. scale of 3 ft. 6 in. gauge and it ran in the 1976 IMLEC at Kinver where Jack and his clubmate Jack Busbridge thoroughly enjoyed themselves. Jack Love wrote to me in advance of his coming and, amongst other things, mentioned that the quoted air freight for the *locomotive alone* was £300 and up to the end of May that is what it would have cost to bring it to this country which is sufficient to dampen the ardour of the most enthusiastic live steamer. But South African Airways subsequently decided to carry it free of charge, a most handsome gesture on their part which I feel would be difficult if not downright impossible to experience in this country; (oh dear, I nearly waxed bitterly political, but back to trains). Jack said the only alteration to the 6C since we last saw it was that the six-element copper superheater had been replaced by a three-element radiant one of stainless steel. As before, Jack Busbridge was the driver.

Load for the run was driver, observer and 4 passengers. Some light rain began to fall and on the damp rail the engine got away with carefully controlled slip to take the train round to the foot of the bank. A lot of slipping occurred all the way up the bank with the rain getting heavier and the train going slower. Just past the permanent station is a short tunnel (of trimmed evergreen) in a cutting and at its entrance the train came to a stand. One passenger got off and the train was set back a considerable distance where a truck was taken off and the load reduced to two passengers. The rails were still very wet and after another stop at the top of the bank the engine began to make some progress. By now about half the time allowance had been used and fortunately the sun came out enough to dry the rails and Jack was able to crack on speed and complete the run in good style.

It transpired that this was the only run affected by rain and the judges sportingly (and wisely I think) offered the Cape Town chaps another run later. Both Jacks were very happy at this, after all, when you've come 6,000 miles it is a crying shame

to have a typical British summer put the damper on the only half hour which really matters!

A little diversion here whilst on the overseas aspect of the Competition. There are generally a few model engineer visitors from abroad at IMLEC and I notice that their numbers increase each year. This year they included Charles Cormack and his wife from Canterbury, New Zealand; John MacDonald from British Columbia; Ken Tinkler of Melbourne, Australia who is alleged to have his own private tunnel direct from "down under" and pops up out of the ground at the first whiff of hot steam oil; Bert Kirby of Victoria, Australia in company with a few others of his countrymen; in addition there was the Nederlands contingent in support of Willem van der Heiden. The two Cape Town chaps had a lot in store for them while they were in this country, a visit to Chichester the next day and thence with Bob Gale to his home track at St. Mellons, S. Wales.

Run No. 5

This is best entitled the *cliffhanger*. Percy Wood's result was put on the board around 11.30 a.m. and it stayed at the top for the rest of the day. Percy's locomotive is a 5 in. *Maid of Kent,* well past her first flush of youth. The engine is the inside version with Joy valve gear. There is a radiant superheater fitted and boiler feed is by injectors only. Since its last appearance at the 1976 Competition at Kinver where this *Maid* came in fourth, Percy has made only one change to the engine and that was to lag the boiler. The *Maid* is plain and workmanlike and the accent is on work; I've driven it myself and have a healthy respect for its capabilities. It works regularly passenger hauling on his home track at Chingford.

Load for the run was driver, observer and 6 passengers, two less than at Kinver. Percy is a very capable driver and knows his *Maid* very well and he got away to a careful start with not much slipping which was quickly controlled anyway. The first two laps were taken at a decent speed and then there was a marked slowing on the third lap towards the top of the bank. Then Percy got the feel of the track and thereafter ran very steadily at about 8 mph cracking on a bit more up the bank. The engine springing has been carefully adjusted and it is more sure-footed than the average 4-4-0. The exhaust beats were loud and clear and Percy paid regular attention to the controls and fired regularly as well. On the last lap but one the train came to a stand at the top of the bank and it had to set well back before a sure re-start could be made. After that, the last lap was completed in fine style. Percy said later that the handbrake of the dynamometer car could be pushed on by the driver's knee and this had happened to him and accounted for the train coming to a stand. It had been a good run, mostly very steady and the result was awaited with intent interest; it was not to be beaten although there were some good and exciting runs later.

For comparison, here are the performance figures of the *Maid's* two runs in the Competition.

	1976	*1978*
Time, minutes sec.	29 mins., 16 sec.	31 mins., 03
Distance run	19,425 ft.	18,256 ft.
Work done ft./lb.	328,700	367,720
Ave. d.b.h. p.	0.34	0.358
Coal used, lb.	2.49	2.047
Spec. fuel consumption	14.99	11.021
Efficiency per cent	1.21	1.614

I expect readers will know all about Parkinson's Law, in which case they will understand that out of 60 mono negatives and 40 colour transparencies, I have two duff shots, both of the *Maid,* and need I say, of course!

To be continued

TROJAN MARK II

by J. P. Bertinat

Part IV *Continued from page 916*

THE DRAWING OF the bedplate, Fig. 33.17, shows a transverse rib or web underneath the forward main bearing; this is not present in the Mark I casting, but its addition to the pattern should create no problem. The rib serves to stiffen the casting in its most heavily loaded area and is in keeping with good engineering practice.

The first operation on the casting is to clean up generally with files so that the surfaces which are not to be machined will present an acceptable appearance; make sure that the openings for crank and eccentric are not undersize. To provide a datum for machining the faces, the bosses and the bearing seatings are dressed with a file so that the casting will sit, without rocking, on a flat surface. In order to hold the work for facing the underside of the base, I clamped it to the face plate by means of a drawbar through the mandrel, using a large square washer fitted into the recess in the casting. This is shown in Fig. 34 and this method of holding was used since the slope of the sides of the casting would have rendered the work difficult to grip safely in the four jaw chuck. The actual facing cut is taken with a slightly rounded tool which should be honed before taking the finishing cut in order to obtain a clean finish; aim at removing the minimum amount of material consistent with cleaning the whole of the base of the casting.

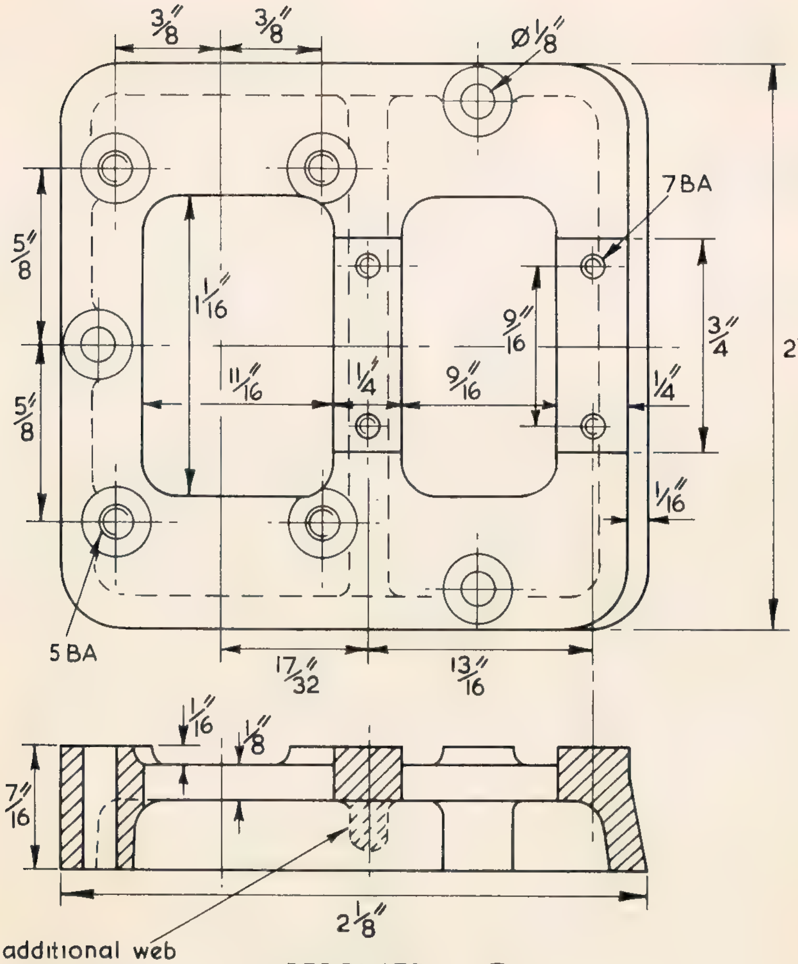
Fig. 34

The top face can be dealt with by holding the work in the four jaw chuck in the usual way, the taper on the casting improving the grip in this case. Aim at securing a clean finish on all the bosses and the bearing seatings; The 7/16 in. dimension for the overall thickness of the bedplate is of secondary consideration.

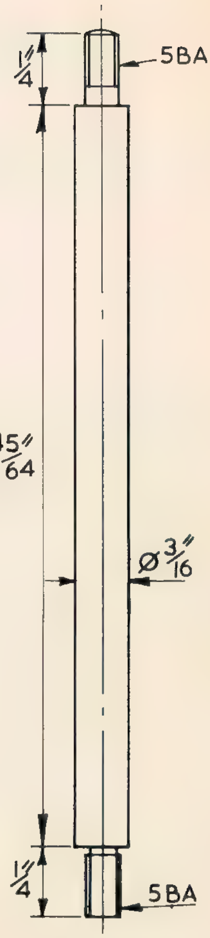
Next to be tackled are the tapped holes for the columns and these must correspond with their counterparts in the bottom cylinder cover (for the drilling of which a jig was made). For appearance sake these holes should come in the centre of the bosses provided for them, and in the Reeves castings it will be found that the bosses are accurately located. Without considerable and unwarranted elaboration, it is difficult to locate the previously made jig on the boss centres and I simply centre popped these boss centres and then applied the jig to check that said centre pops could be centred on all holes simultaneously; this being found satisfactory, the holes were drilled No. 38 and tapped 5 BA. If no tapping device is available, I advise starting the tap in the drilling machine (turning the chuck by hand), since it is imperative that the screwed holes are square with the base. Next the three 1/8 in. dia. holes for the holding down bolts are drilled in the centres of their respective bosses and the casting is then set aside until the bearing housings and their bushes have been completed.

Columns. Fig. 33.18

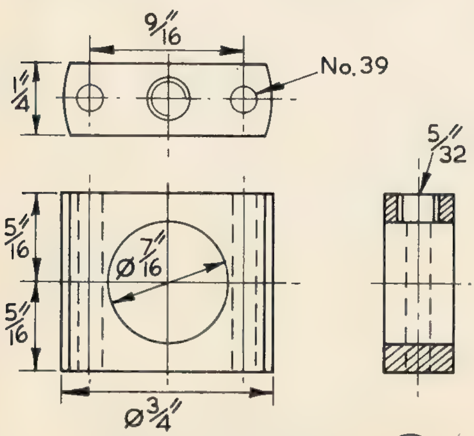
These are made from a straight length of 3/16 in. dia. b.m.s. The lower ends of the four columns are turned first and threaded 5 BA and it will pay to undercut the shoulder to a depth of .016 in. with a narrow parting tool, in order to ensure that the columns will screw down squarely into the base. It is important that the four columns are of equal lengths between the shoulders since any errors in this respect will produce distortion when the engine is assembled. I coated the top ends of the partly finished columns with marking fluid and then, using the depth gauge attachment on the blade of my combination square, carefully scribed the position of the top shoulder at 2 45/64 in. from the base flange; an ordinary depth gauge or even an adjustable square would serve almost as well. The column was then mounted in the three-jaw chuck with the shoulder position about 1/8 in. clear of the jaws, and a knife tool carefully advanced (without cutting) to the marked shoulder, moving the slide by means of the leadscrew handwheel — or top slide screw; the slide index reading is noted and this reading is used to control the length of subsequent cuts. The reason for this roundabout way is that if cutting up to the line is attempted directly, it will be found that the swarf released by the tool is likely to obliterate the scribed line just before the tool gets to



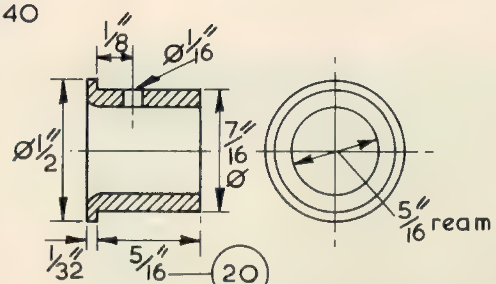
BEDPLATE (17)



COLUMN (18)



BEARING HOUSING (19)



5/16 — (20)

3/8 — (21)

BEARING BUSH

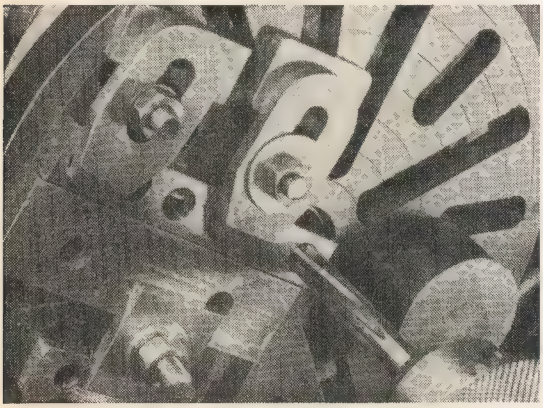
Fig. 33

it! There is no need to undercut the shoulders at the top ends, and the 5 BA thread needs only extend to 3/16 in. from the end, leaving 1/16 in. at full diameter for location.

Bearing Housings. Fig. 33.19

The housings I have made for the engines used to illustrate the machining sequence were made from a length of 3/4 in. x 1/4 in. b.m.s. and I left the bar in its 3/4 in. wide state without forming the radius on the outer edges — this would have meant starting from a larger bar to ensure cleaning up but would, I think, have improved the appearance. A length of bar sufficient to make three pairs of bearings was cut off and the centres of successive bearings were marked along the length of the bar; the centre of the 3/4 in. width was then marked on the end bearing, and the bar clamped to the face plate with this centre running truly. Fig. 35 shows the set up, and also shows another strip clamped alongside the bearing bar; this strip serves as a locating slide along which the bearing bar is slid for boring the sequence of holes. These holes are drilled, bored if necessary, and reamed 7/16 in. If, like me, you are using a Drummond lathe or similar machine with a No. 1 Morse Taper mandrel, take care not to poke the reamer through too far or your headstock spindle will be minus half its taper!

Fig. 35



The bearings are then sawn apart, the initial marking out ensuring that there was sufficient material for cleaning up after this process. It is essential that the centre heights of a pair of bearings are exactly the same — the actual measurement is of less importance — and to achieve this, the bearings (six in my case) were threaded on to a piece of 7/16 in. dia. b.m.s. which was cut a shade shorter than the sum of the bearing thicknesses and all were machined at one setting. For this purpose the composite block was set firmly and squarely in the milling machine and the bearing bases machined with

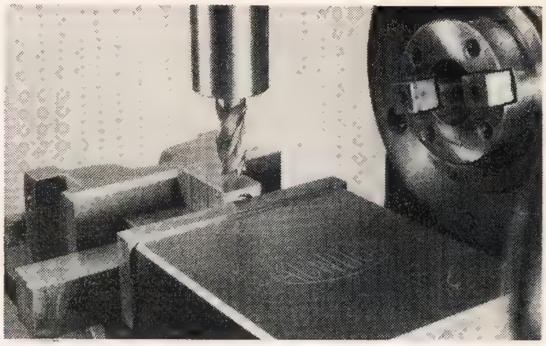


Fig. 36

an end mill. Fig. 36 shows the set up, which could equally well apply to a vertical slide in the lathe, but in this latter case I would not attempt to grip more than two bearings simultaneously. It will be noted that the edge of the 7/16 in. hole projects slightly above the vice jaws in order to provide a measuring point; the milled surface should finish at 3/32 in. above the edge of the hole. The block of bearings is then inverted in the vice for milling the top face; in this case the work can rest on a parallel strip of appropriate thickness. Before the bearings are removed from the mandrel, some identification mark should be made on what should be the bottom surfaces.

For drilling the holes for the holding down bolts and for the oil hole, I favour the use of co-ordinate drilling in the lathe or miller; it ensures uniformity and is much quicker than marking out and drilling, even for one set of bearings. Fig. 37 shows my set up on the ML7; the vertical slide is set up facing the chuck and the machine vice set with its jaws truly horizontal. The slide is adjusted for height by placing a piece of 1/4 in. dia. silver steel in the chuck and setting the bottom or fixed jaw of the vice to just slide over the rod. The work is set laterally against and in front of this rod and the cross slide adjusted so that the work is central in the vice and the feed screw reading is 75, *feeding inwards*. The round bar is now removed, taking care not to disturb the work, and the vice tightened firmly. I also used a piece of 3/16 in. square material at the base of the vice to ensure squareness, this material being removed after clamping and before drilling. The slide is now wound in 1¼ turns, bringing the dial reading to zero and the edge of the bearing housing to the lathe centre. The three holes to be drilled are accurately located by winding in the cross slide to readings of 0.$\underline{94}$, 3.$\underline{75}$ and 6.$\underline{56}$ respectively; the underlined figures are dial readings and the whole numbers preceding them are complete turns of the feed screw. I found it quicker to centre drill all holes first, following with the No. 39 drill for the first and last holes and finally with a No. 30 hole and 5/32 in. x 40 tap for the central oil hole.

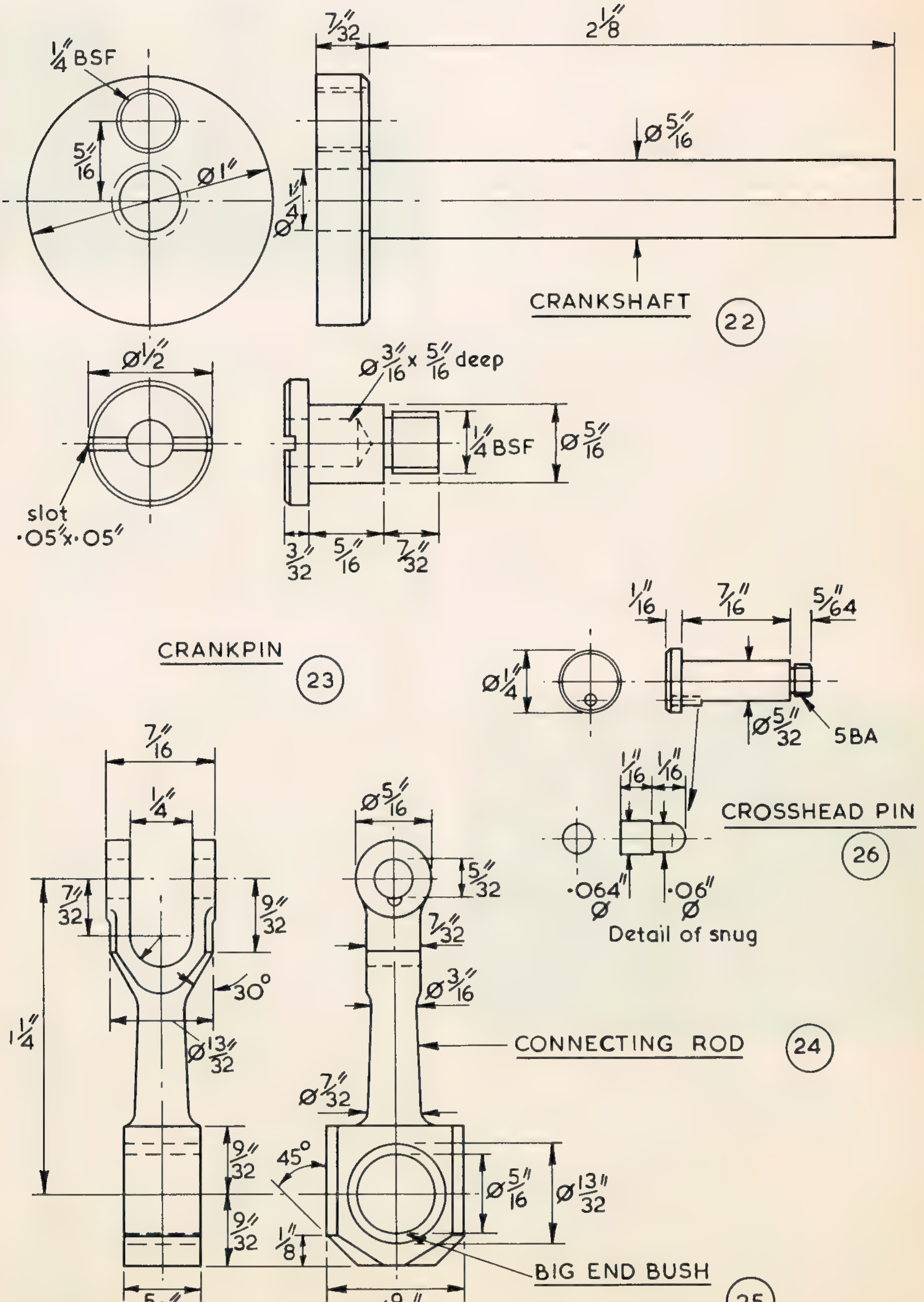

CRANKSHAFT
22
1/4" BSF
5/16
Ø1"
Ø 1/4"
7/32"
2 1/8"
Ø 5/16"
CRANKPIN
23
Ø1/2"
slot
·05"x·05"
Ø 3/16" x 5/16" deep
1/4" BSF
Ø 5/16"
3/32"
5/16"
7/32"
CROSSHEAD PIN
26
1/16"
7/16"
5/64"
Ø1/4"
Ø 5/32"
5BA
1/16"
1/16"
·064" Ø
·06" Ø
Detail of snug
CONNECTING ROD
24
7/16"
1/4"
7/32
9/32"
30°
1 1/4"
Ø 13/32"
Ø 5/16"
5/32"
7/32"
Ø 3/16"
Ø 7/32"
9/32"
9/32"
45°
1/8"
Ø 5/16"
Ø 13/32"
5/16"
Ø 9/16"
BIG END BUSH
25

Fig. 39

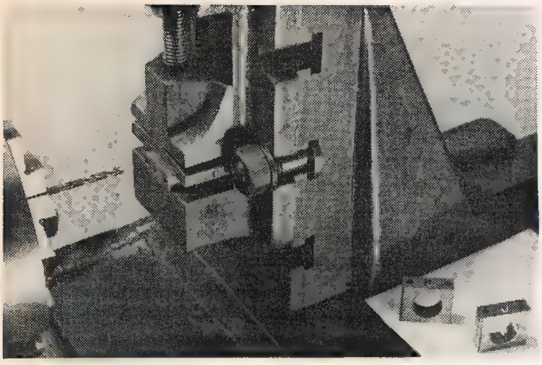


Fig. 37

Bearing Bushes. Fig. 33.20 & 33.21
These are plain turning jobs and are made from 1/2 in. dia. drawn gunmetal or hard brass rod. To avoid collecting too many short ends of this material, I cut off a length sufficient to make a pair of bushes i.e. a piece 7/8 in. long. This was chucked in the three-jaw chuck with 1/2 in. protruding, faced, centred, drilled and reamed 5/16 in. dia. right through. The outside was then turned down to a press fit in the bearing housing for a length of 3/8 in. (I usually turn the part which will ultimately be projecting to a close push fit and then make the remainder about .001 in. larger; this reduces the length which has to be squeezed in, and provides a lead which helps the parts to go together squarely). It must be emphasised that when press fitting parts together, the surface finish should be as smooth as possible; circumferential machining marks indicate the presence of humps and hollows which become flattened during the pressing process and seriously impair the grip. With a parting tool the dividing line between the two bushes is marked, but they are not separated. The work is now reversed in the chuck and the outside of the other bush turned, and the parting off completed. N.B. I have assumed that the chuck is not more than .001 in. out; if this is not the case use will need to be made of a Griptru or four-jaw chuck, or the second bearing finished on a stub mandrel. Finally the flanges of the bushes are faced to 1/32 in. thick.

I found it convenient to drill the oil holes in the bushes after pressing them into their housings. To ensure that the holes were central with the tapped hole, I made a simple drill bush from a short piece of 5/32 in. dia. brass rod; this was threaded externally to fit the hole in the housing and drilled 1/16 in. axially and a slot cut in the top to enable it to be withdrawn from the bearing after use. Fig. 38 shows the bearing with drill and jig in position.

To complete the bearings, the 5/16 in. dia. reamer will need to be poked through them again to compensate for the closing in during press fitting and to clear drilling burrs. *To be continued*

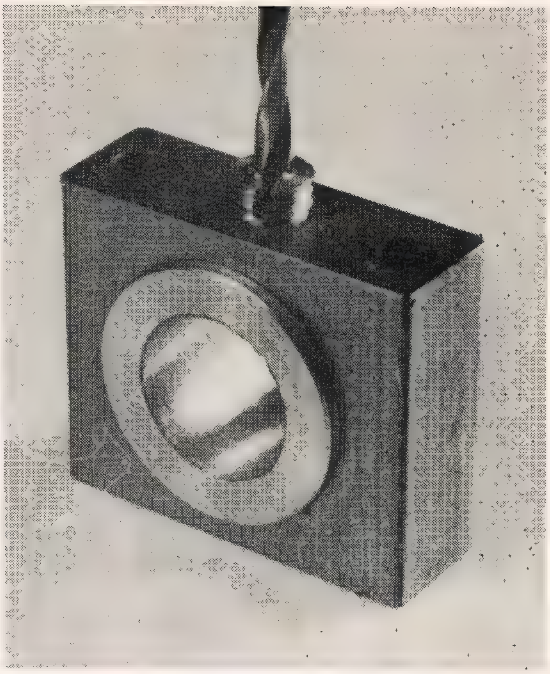
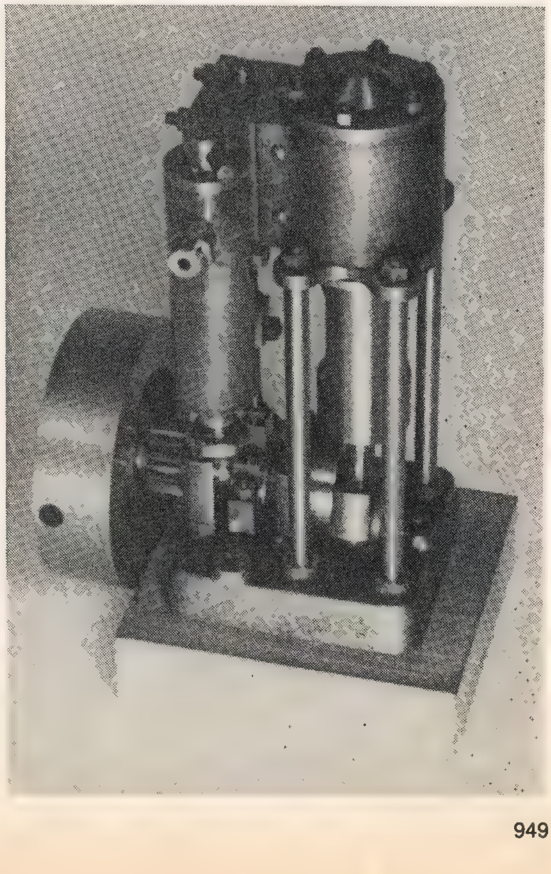
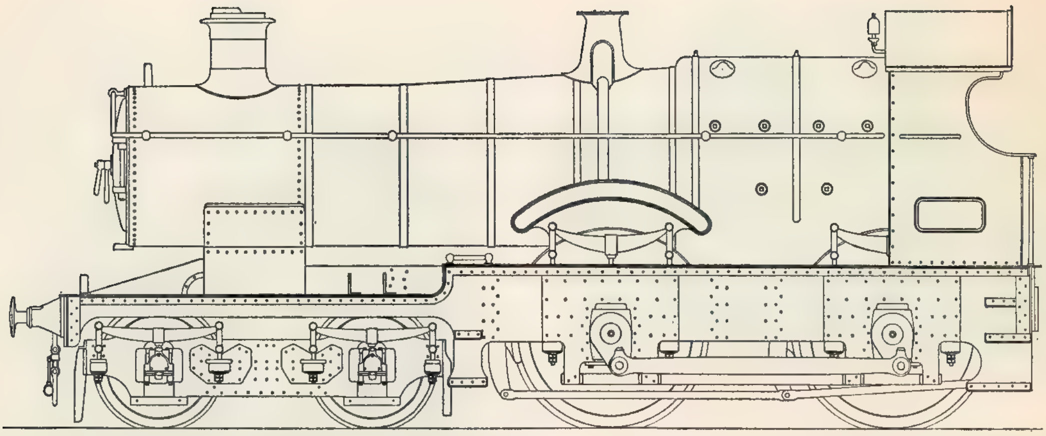


Fig. 38

Engine with displacement lubricator.





BULLDOG/DUKEDOG

A 5 in. gauge loco described by Keith Wilson

Part VII

From page 819

FOR THOSE BUILDERS who have survived so far, herewith one of the most difficult parts to date. I cannot solve the problem of making it exactly as per prototype, for I have no assistant small enough to crawl inside and "back" the rivets; since probably no-one else has either then we are forced to modify. I have tried to keep this to a minimum.

There is no problem in making the individual parts, although try to keep the rivet holes exact as there is not much clearance. The trouble comes on assembly or rather on trying to assemble! Fortunately I am making two of these in my spare time (when I've got any, that is) and so I can try out crazy ideas on one, vary it for the other and then try to remember what I have done to the things so that I can write it up. It seems to be best to assemble in stages.

Stage 1

Plates A. Assemble these with the angles E. To deal with parts like this, I use a pair of small toolmaker's clamps. (Or should it be toolmaker's small clamps? Depends on size of toolmaker I suppose.) It is then easy to locate the angle in the correct position by holding it on a flat surface such as a faceplate; drill one of the end holes, and push a rivet through both parts. Do not bash up the other end of the rivet yet, for its purpose is only to help locate the angle whilst the rest are drilled. With all holes drilled, clean off one end, use a dollop of Loctite or Araldite and then copper rivets. Repeat for opposite end of plate, then for other plate.

Stage 2

Plate F and its angles C and D. Do the long ones first, then fit in the short ones at each end.

Stage 3

Plates B and their angles D. These do not shew up very well in the drawings, so note that the angle projects on the opposite side to the two flanges already beaten over.

Stage 4

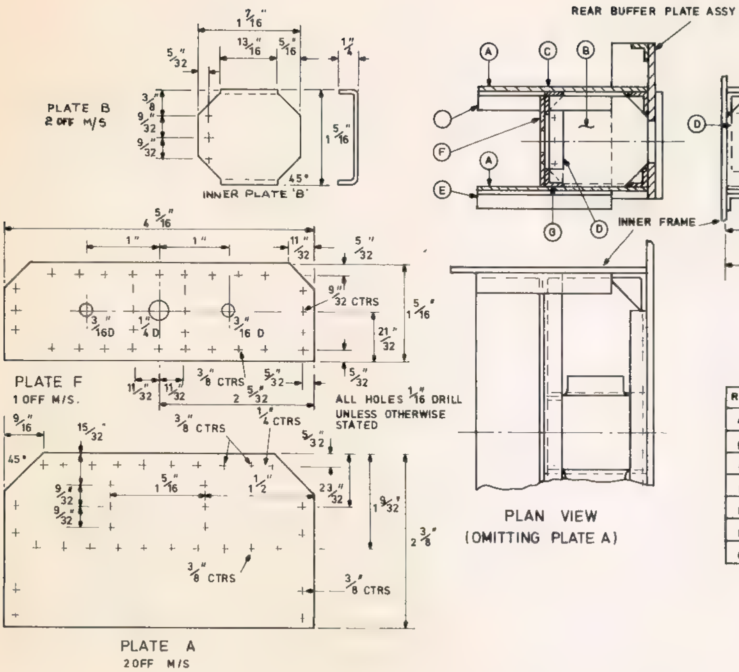
Adding stage 3 to stage 2. Get a piece of metal 1 in. wide, use it to space out the plates B at correct distances and then clamp; this unit may now be easily located on stage 2. Same treatment as before.

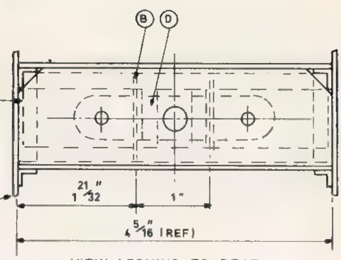
Stage 5

Assembly of stages 4 and part of stage 1. Once again, the clamping technique; four clamps for best results. Then drill and use copper rivets for the brass angles, and preferably steel rivets for the flanged bits.

Stage 6

Tricky here. Plate A (lower) has now to be attached to assembly of stage 5, but must not be permanent fixing. I suggest the use of short rivets put through plate A lower only, and the use of 6 off 8 BA hex head screws for fixing. One goes at each outer corner tapped into the angle C, two more near the centre of angle C and two into the holes halfway along flanges of part B.





VIEW LOOKING TO REAR

DRAWBAR BOX ASSY

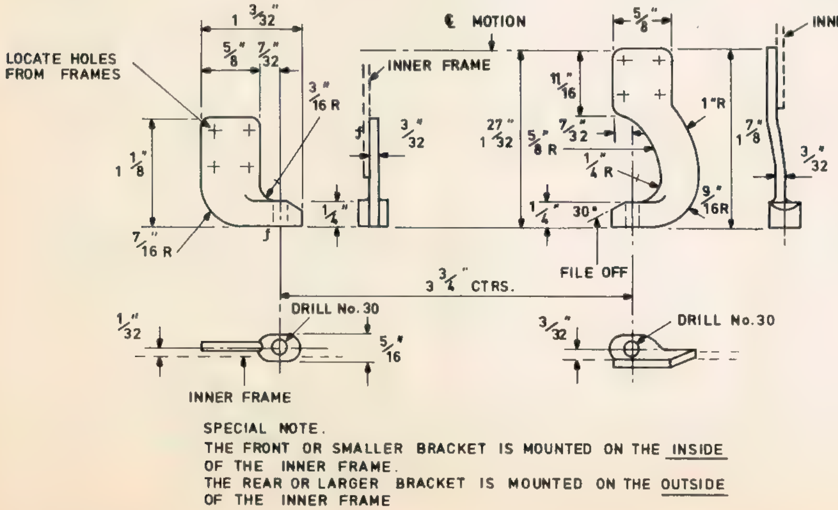
REF	DESCRIPTION	DIMENSIONS	LENGTH	No	MAT L
A	PLATE	2 3/8" x 1/16"	4 5/16"	2	M/S
B	INNER PLATE	1 7/16" x 1/16"	1 5/8"	2	M/S
C	ANGLE	1/4" x 1/4" x 1/16"	3 13/16"	1	BRASS
D	ANGLE	1/4" x 1/4" x 1/16"	13/16"	4	BRASS
E	SIDE ANGLE	1/4" x 1/4" x 1/16"	1 7/8"	4	BRASS
F	FRONT PLATE	1 5/16" x 16 g	4 5/16"	1	M/S
G	ANGLE	1/4" x 1/4" x 16g	4 5/16"	1	BRASS

Stage 7

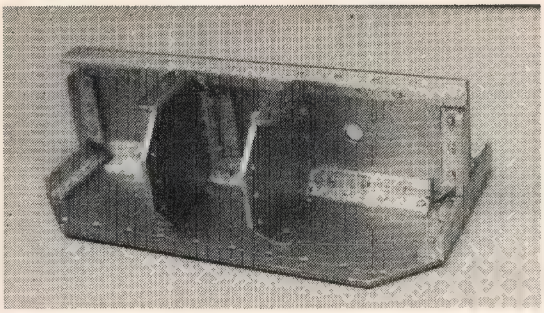
Adding this dragbox assembly to the rear buffer plate. The dragbox should be square and rigid; and should slip easily into place onto the rear buffer plate. Clamp, drill one or two holes, push rivets in to assist clamps, and drill remaining holes. *Do not assemble permanently* yet, for if you do it will make life difficult when we come to assemble the frames. (Don't worry — I'm looking forward to that stage too.)

For those who are perhaps not quite so exacting, I have arranged for a casting for the dragbox. It is not quite so realistic, but I can assure you that it's a lot simpler. It needs machining off at each side and cleaning up at the rear end to match the buffer plate. Then drill the holes for the drawbars. The central drawbar did the work, the side pair being for breakages of the central one, as one can imagine what would happen were the main drawbar to break. It would of course be when the loco was pulling hard, and the crew would certainly be jerked off the footplate onto the track. Although the brakes would be applied automatically to the train, it would be too late to save the crew's lives.

As a matter of interest, these locomotives had steam brakes, and whilst the vacuum brake was



INSIDE SPRING BRACKETS
2 OFF EACH – HANDED.
MATL. CM CASTING M/S



applied in proportion to the application strength of the steam brake I am not sure if the application of the vacuum brake from the train would also automatically apply the steam brake to the engine and tender. I have not actually driven one of these locos (although I have been at the regulator of trains on the G.W.R. on occasions) so cannot say from my own knowledge. Holcroft does not appear to mention this aspect; but no doubt some of our readers will know and I hope will pass on the knowledge.

The cast version of the dragbox would be best attached with screws rather than riveted to the frames but we will come to that later.

Inside Spring Brackets

Castings will be available; it's not worth fabricating; the originals were castings anyway. There is no particular problem in machining them; they may be fixed permanently to the frames right away; but do keep the spacings right or the springs won't fit properly. It is best to make a little jig for this; an odd bit of angle long enough to reach both bracket holes can be riveted or silver-soldered to a piece of sheet metal that can then be clamped to the frames to hold the brackets in the right places. Don't forget the bonding material (Loctite or Araldite) and that's another bit of bother dealt with.

To clear up some points that have been raised in direct correspondence, I am planning to describe both types of boiler; the taper one for the Bulldog and the parallel one for the Dukedog; plus of course the relevant interior details and such platework as may be different from one engine to the other — cabs, for example. The tenders can be identical.

The G.W.R. standard tenders ranged from a titchy little one of 2000 gallons capacity, with only 11 ft. wheelbase. This was to increase the availability of the Dukes for certain parts of Devon and Cornwall, for there were cases of very short turntables. Later the tables were enlarged, but I do not know when the last 2000 gallon tender disappeared. J. N. Maskelyne shews one in *Locomotive's I have Known*; part 1, page 62.

The next size was 2500 gallons; with 13 ft. wheelbase. This was much more common, especially when trains grew in size and track items grew to suit them. Then came the 3000 gallon; this was a very common size and appeared behind many Bulldogs, Dukes and Dukedogs, etc. Churchward later had a slightly different version of this tender; as far as I can see the difference lay in the framing. To get the 3500 tender, it seems that the tank was the same profile, but wider; some at least had a "well" in the centre to increase capacity. Every one of the larger classes had one of these when first introduced as a new design of loco; then along came the famous Kings and we had the 4000 gallon tender. This time, the increase in dimension was upwards; later all Halls, Stars, Castles, 47XX, had one, also many of the Granges and I believe one or two Saints. All these later and larger tenders had 15 ft. wheelbase; all equally divided.

My remarks re printing of names and addresses has raised some interesting points; and one or two letters have been beautifully written out in almost "copperplate" style. However, the text generally of a letter gives a guide to a "missing" word and it is usually easy to decide just what is meant. This is of course impossible with names and most parts of an address; of course "road", "street", "avenue", "close", etc. are obvious. But with names of roads then things are a bit less easy. Likewise towns, counties. The most obvious example is *Hertford/Hereford*. Only one letter different, but quite a distance! It can sometimes mean, when you don't get a reply, that the replier has done his best but the letter has been addressed wrongly. Hence my comments. We aim to please, will you aim too, please?

For those who are using a series in *M.E.* — any series — looking for a given part can take time; especially if reference has to be made frequently between one part and another. Self-adhesive labels are available; I find one about 1½ in. long and 3/8 in. wide forms a neat strong two-faced tag that can stand out about 1/4 in. from the top of the page. If the volumes of *M.E.* are bound, or kept in retaining folders, then "stagger" the tabs and also write the number of the part of the series on both faces. Saves a few otherwise annoying seconds.

To be continued

Although these articles have not yet seen the completion of the frame assembly the availability of castings has progressed far beyond. Messrs. A. J. Reeves of Birmingham are able to offer a comprehensive list.

★ ★ ★

Correction. The issue of 21 July, page 818, gave the illustration as being twice full size. This, of course, refers to the working drawing. The view shown was approximately full size.

JEYNES' CORNER

Stuart Engines

THE EDITOR'S remarks in "Smoke Rings" in *Model Engineer* for 2 June that Stuart Turner held a stock of over one million parts, reminded me of the Stuart model engines I have built, now dispersed I know not where. I was an early buyer of their sets of castings, ranging from the twin cylinder enclosed crankcase 5/8 in. x 5/8 in. launch engine to their 1/2 h.p. two-stroke vertical engine.

The twin-cylinder engine I have just mentioned was rebored to 3/4 in. supplied by steam from the boiler I described in the issue for 7 March 1975; two friends also bought sets of these castings for which I made two more boilers.

My first purchase was a set of No. 8 vertical 1 in. x 1 in. castings, and as I had been very, very disappointed with some castings I had purchased elsewhere, these were a revelation, no hard spots. One of the early No. 10 verticals followed, and I still think this design was far more realistic than the combined crosshead bored guide and standards. It was much more like the engines I was just beginning to get familiar with, on lighting sets. Of course the single standard and front columns required some real fitting to get right, whereas with the present design the veriest tyro should have no bother in lining up the crosshead guide, and cylinder bore. I might mention that the complete set of castings all machined, with all bolts and nuts, were priced 10s. 6d. *Post Free*; the Post Office would charge more today in postage.

The 1914 war came along, and model making was out for the time being, and after hostilities came to an end, the price of the No. 10 series went up to 21s., still *Post Free*, for both horizontal and vertical types.

I built another No. 8 vertical, this time with double standards forming the crosshead guide. I finished the guide surfaces first, and clamped on a square mandrel to face the top and bottom seats.

I never built the No. 9 horizontal, as I did not like the design. The cylinder always seemed to me to have been designed for a vertical engine and I have noticed that many builders have placed the drain cocks at the bottom, where they should be, instead of on the horizontal centre line. The governor drive didn't fall in with my ideas at all, having had some very wry experiences with this type in full size, a pair of bevel gears makes all the difference, in operation and appearance I think.

Quite a number of my acquaintances used the sturdy 1/2 h.p. Stuart gas engine to drive their workshops, while I have seen the 1/8 h.p. Stuart doing good work. Here again, I disliked the overhung crank.

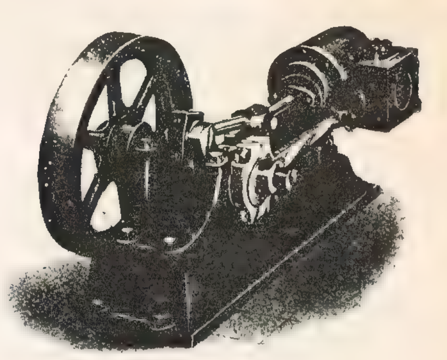
While mentioning my dislikes, I must include the Stuart flywheel spokes. I have spent many hours filing them to a taper; unless treated thus, I always think they look clumsy.

I do not expect many readers have seen the enclosed single-cylinder Stuart steam engines built for lighting sets on tugs, small yachts, etc. One of this type is fitted on the Fowler road locomotive which hauled the new locomotive from York to

Two 'Model Engineer' advertisements from many years ago.

Ravenglass. Again I wonder how many know that Stuart Turners manufactured motor cycles, a Stuart 300 cc. two-stroke engine in a Chater Lea frame. They also produced a two-stroke twin engine with integral gearbox in 1912. At this time they were offering 250 watt two-stroke lighting plants, two-stroke engine and dynamo on cast iron bedplate for £12 18s.

Finally, looking back over the years, long before I owned a lathe, being caught by the charge-hand with a Stuart crankshaft, having turned the parallel shafts, I was wondering how I could turn the crank pin without attracting attention: instead of the expected reprimand, a very relieved apprentice was shown how to do the job, after he had taken it away and fitted two false centres, this made me wonder if he was also building a Stuart 1 in. x 1 in. Not everybody who got a foreigner (that's an illicit job), done by the chargehand himself. If that engine still exists, it will be 70 years old now; it bore a small oval brass plate engraved "Jeynes. Maker. Coventry"; possibly some reader may own this engine; the port-face is sheet brass sweated to real port-face, as I had no means of machining the cast iron ports.



YOU CAN BUILD THIS ENGINE WITHOUT A LATHE!

THE STUART NO. 10 HORIZONTAL.

Complete set of castings and parts, beautifully and accurately machined, and all screws, bolts and nuts. **21/-** post free. BOX BED **2/9** extra. — Complete catalogue of all our engines, 1od. post free.

STUART TURNER, LTD., HENLEY-ON-THAMES.

Another advertisement taken from 'Model Engineer' of long ago — the first being 1913.

CLUB DIARY

Dates should be sent at least five weeks before the event to ensure publication. Please state venue and time. While every care is taken, we cannot accept responsibility for errors.

AUGUST

18 Rochdale S.M.E.E. Mr. T. Brooks — Farm Carts. Springfield Park.
19 Gauge 1 Model Railway Association. Get together.
19 Milton Keynes Model Society. Portable track and models exhibition. British Rail Works show. Wolverton. Milton Keynes. 2 p.m.
19 Chesterfield & District M.E.S. Steam day. Track — Hady.
19 Gauge O Guild. Annual meeting in S. Wales held at St. Mary's Church Hall at Marshfield midway between Newport and Cardiff. Running track.
19 N. London S.M.E. Fete—Kings Langley.
20 Cannock Chase M.E.S. Visit Stafford M.E.S., at County Showground 2 p.m.
20 Northampton S.M.E. Public running day a. Delagre Park, London Road, Northampton, from 2.30 – 5.30 p.m.
20 King's Lynn & District S.M.E. Public running. Walks track. London Road, King's Lynn. 2 – 5 p.m.
20 Ardeer Recreation Club — S.W. Scotland. Meeting 12-6 p.m.
20 Worcester & District S.M.E. Waverley Street, Dighs, Worcester. Public running day.
20 Bedford M.E.S. Grand T.E. Rally. 11 a.m. at the Track Site, Wilstead, Bedford.
20 Guildford M.E.S. Public open afternoon.
20 Bristol S.M.E.E. Public running day at Ashton Court track. 11 – 6 p.m.
20-21 Kew Bridge Engines Trust. Fire fighting through the ages. Kew Bridge Pumping Station, Green Dragon Lane, Brentford, Middx.
21 Wigan & District M.E.S. Meeting.
21 Peterborough S.M.E. Club Night.
21 Willesden & W. London S.M.E. Brent Show.
22 Romney Marsh M.E.S. Track Meeting at Rolfe Lane, New Romney, 6 p.m.
23 Andover & District M.E.S. Working evening. Red Rice.
23 Bristol S.M.E.E. British Rail Staff Ass. Club, The Incline, Temple Meads Station. 7.30 p.m. On the table, bring your models under construction.
23 Harrow & Wembley S.M.E. Track meeting, Roxbourne Park track, 7 p.m.
23 and 30 S.M.L.S. The Railway will operate. 2-5 p.m.
24 Hull S.M.E. Surprise Night.
25 Hereford Live Steamers & M.E.S. Bulmers, 8 p.m.
26 Cambridge & District M.E.S. Track Day. Fulbrooke Road, Cambridge. Open to public 3 p.m.
26 N.L.S.M.E. Late night run. Colney Heath. All sections invited.
26-27 Bristol S.M.E.E. Public running days at Ashton Court track, 11 a.m.-6 p.m.
26-27-28 Whitchurch (Cardiff) & District M.E.S. Open Days at Headquarters.
26-27-28 Crofton Beam Engines, nr. Gt. Bedwyn, Wilts. The Crofton Society, 273 E. Grafton, Burbage, Wilts.
26, 28 G.E.C. (Coventry) M.E.S. Stoneleigh "Town & Country" Festival. Exhibition and Portable Track.
26-28 Peterborough S.M.E. Expo Steam (M.E. tent).
27 Guildford M.E.S. Barry Cole's loco trials at H.Q.
27 King's Lynn & District S.M.E. Boat meeting. B.I.S. lake, Leziate, 9 a.m.
27-28 Combe Mill Society. At Combe Mill, nr. Woodstock, Oxon, 10 a.m.-6 p.m.
27-28 Papplewick Pumping Station, Longdale Lane, Ravenshead, Notts. Open Day.
27-28 Chesterfield & District M.E.S. Steam Days. Papplewick Pumping Station.
27-28 Harrow & Wembley S.M.E. Harrow Show. Public running. Roxbourne Park track, 2 p.m.
27-28 Midland Counties Miniature Steam Engine Club. Helping at Mirk Hall to raise money to send to the Variety Club of G.B. for their mini bus appeal. All day.
27-28 Malden & District S.M.E. Open day, 2.30-5 p.m.
28 Horsham Lions Vintage Transport Rally, in Horsham Park.
28 Bracknell Railway Society. Public meeting.
28 S.F.M.E.S. Polegate & District Comp. day.
28 Bressingham Live Steam Museum & Gardens, open 1.30-6 p.m.
28-29 Leicester S.M.E. Public running at the City of Leicester Show, Abbey Park, Leicester.
30 Cannock Chase M.E.S. Meeting Cannock Park 7.30 p.m.
31 Leyland, Preston & District S.M.E. Meeting at Roebuck Hotel, Leyland, 8 p.m.

SEPTEMBER

1 Rochdale S.M.E.E. Springfield Park. General meeting.
1 Romford M.E. Club. Competition night.
1 The Model Engineers' Society N.I. Monthly meeting. Cregagh Library, Cregagh Road, Belfast, 7.30 p.m.
1 Vale of Aylesbury M.E.S. Jubilee Hall, Bierton, Aylesbury, 7.30 p.m.
2 Hull S.M.E. Exhibition at Ferriby Show, North Ferriby Village Hall.
2 Ickenham & District S.M.E. Public track running, rear of Coach & Horses, Ickenham, 2-6 p.m.
2 Wirral M.E.S. Annual outing to Llanberis and Lake Padarn.
2-3 Tyneside M.E.S. (with Tyne and Wear, County Museums and Northumberland Internal Combustion Engine Restorers' Society). Engine Rally, Exhibition Park, Newcastle.
2-3 "Yesterpower" Society. First great yesterpower stationary engine gathering. Swarkstone, Tournament Meadows, Swarkstone, Derby.
2-3 Milton Keynes M.S. Model boating displays. Cosgrove Water Carnival, Cosgrove, Milton Keynes.
3 S.F.M.E.S. Cambridge & District Society Rally.

Lighted lamp on top of smoke box.

WORKING HEADLAMPS FOR STEAM LOCOMOTIVES

by George Wainwright

Unlighted lamp, approximately twice full size.

Headlamps were an important item on prototype steam locomotives and should be so on models, too. Here George Wainwright shows how to produce your own lamps which illuminate for extra effect on night runs

BEING ONE OF THOSE types who believes that there are other aspects to Model Railway Engineering than just running locos, for example, proper rolling stock and signals, it seemed natural to me that the lamp irons on my nearly complete loco ought to carry working lamps. If I was to follow correct practice then the lamps would need juggling about to suit the type of train. The lamp irons would have to be supplied with electricity and the lamps would pick this up as they were slipped into place.

I also required one lamp for the rear end of the driving wagon. I therefore needed two red lamps (the other for the front if working as station pilot or shunting adjacent to main lines) and three yellow. I thought the likelihood of hauling the Royal Train rather remote so the fourth was omitted.

Five lamps plus a couple of spares — this was a production run!

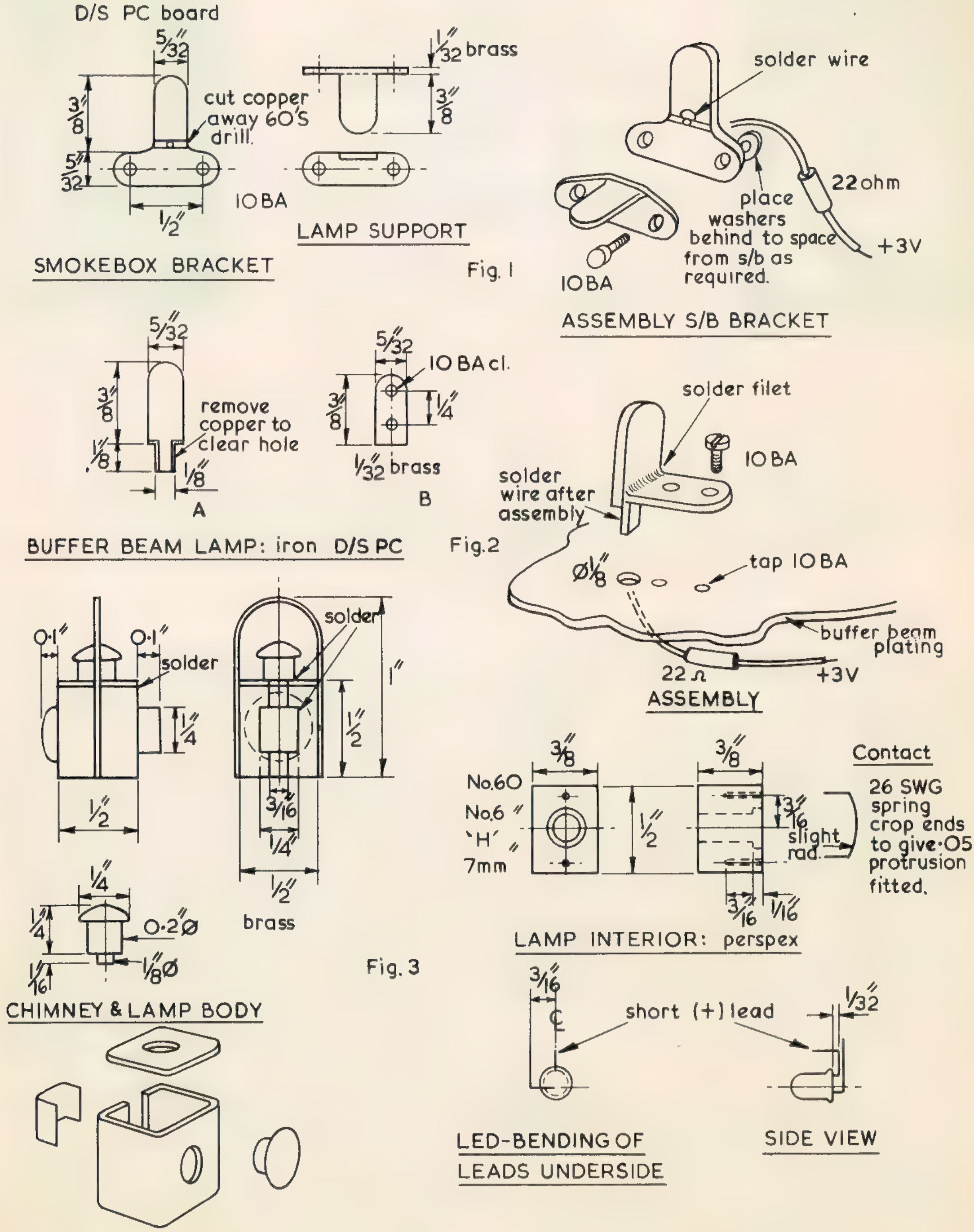
I wanted a lamp which was easy to make, reliable and generally looked "right". The design outline can be criticised by the purists, I know, and anyone who wishes to make more realistic ones can do so without altering the basic principles.

The light itself was to be provided by Light Emitting Diodes supplied via a current limiting resistor from two "penlight" batteries (total 3 v), space for which can usually be found without much trouble. A switch is not essential if the lamps are removed after running, however I fitted one on my L & Y Pug as the left hand sand/tool box was very convenient for both batteries and switch.

I shall describe the lamp irons first, then the actual lamps. There are two basic types, one for vertical surfaces and one for horizontal surfaces. Each type consists of a laminated conductor. Originally I fabricated both types using 10 thou brass and presspahn; but a later design used double-sided fibreglass printed circuit board and I suggest this method is to be preferred (Figs. 1 and 2).

Cutting out the circuit board is easy enough; but use fine-toothed tools to prevent de-laminating. Starting with the vertical lamp iron first, cut out to shape shown. A slot should be cut through the copper only as shown, to separate the "live" terminal from the bracket part which will be the return through the locomotive frames. Drill a No. 60 hole in this slot to allow the wire to pass through from the rear. Bolt up with the bracket using 10 BA hex. head bolts into tapped holes.

The horizontal buffer beam brackets are dealt with rather differently. Cut out a few pieces (Fig. 2) at once, although normally these pieces are quite strong, they are quickly and easily replaced if broken, so one or two extra won't go amiss. The assembly figure is self explanatory; but just a word about soldering. Do use a small soldering iron and


D/S PC board
5/32"
3/8"
5/32"
cut copper away 60'S drill.
1/2"
10 BA
SMOKEBOX BRACKET
1/32" brass
3/8"
LAMP SUPPORT
Fig. 1
solder wire
22 ohm
place washers behind to space from s/b as required.
+3V
10 BA
ASSEMBLY S/B BRACKET
5/32"
3/8"
1/8"
remove copper to clear hole
1/8"
A
5/32"
10 BA cl.
3/8"
1/4"
1/32" brass
B
BUFFER BEAM LAMP: iron D/S PC
Fig.2
solder filet
10 BA
solder wire after assembly
Ø1/8"
tap 10 BA
buffer beam plating
22 Ω
+3V
ASSEMBLY
0·1"
0·1"
solder
1/4"
1/2"
solder
1"
1/2"
3/16"
1/4"
1/2"
brass
1/4"
1/4"
0·2"Ø
1/8"Ø
1/16"
Fig. 3
CHIMNEY & LAMP BODY
No.60
No.6 "
'H' "
7mm
3/8"
1/2"
3/8"
3/16"
slight rad.
3/16"
1/16"
Contact
26 SWG spring crop ends to give ·05 protrusion fitted.
LAMP INTERIOR: perspex
3/16"
short (+) lead
1/32"
LED-BENDING OF LEADS UNDERSIDE
SIDE VIEW

View of battery box (dummy sand/tool box) on L.H.S. of L. & Y. "Pug". Switch points down under running plate and is shown being operated.

only resin cored solder — don't overheat the job — circuit boards don't like it! In fact I suggest that parts A and B are soldered before mounting so as to avoid the engine becoming a heat sink which won't help soldering! The wires to each bracket should be made up with the resistor fitted in the run and sleeved where it can be tucked away out of sight. If available use P.T.F.E. insulated wire especially for the smokebox wire. This can be run inside the smokebox without sustaining damage from heat.

We now move on to our lamp-making proper.

Obtain some 1/32 in. thick, 1/2 in. wide brass strip and a 3/8 in. square forming mandrel. I used a lathe tool. Make half-a-dozen square lamp bodies as shown in Fig. 3 leaving a 3/16 in. gap in one side. Snip off a piece of brass strip just over 1/2 in. long and coat with solder paste after cleaning. Place a lamp body on the coated strip and heat up to sweat together. Don't clean up yet.

Chuck a piece of 1/4 in. dia. brass rod in the lathe and turn half-a-dozen chimneys (Fig. 3). Now drill a 1/8 in. hole in the top centre of each lamp house. Coat the spigot on a chimney with solder paste and push into the lamp house top. Lay the soldering iron on the top of the chimney until the solder paste just melts. Now clean up any overhang of the "lid". Bend pieces of 1/32 in. brass wire to make the handle and solder on, taking care that everything else doesn't fall off with excess heat. Clean up the excess solder.

Using a piece of 5 or 10 thou brass strip form a "U" as shown and likewise solder this over the rear gap. All that remains to complete the lamphouse case is to drill a hole 3/16 in. dia. in the centre front of each lamp.

Chuck a piece of 5/16 in. dia. perspex rod and turn a 1/8 in. length down to 3/16 in. dia. and part off about 1/4 in. long — repeat for six lenses. Now take each lens in turn and just nip this in the three-jaw using the 3/16 in. spigot (or a collet if available). I found that the domed profile made with a needle file followed with a small piece of sandpaper quite easy to achieve. Now take a piece of cloth with some "T" cut or Brasso on and polish the lens front. A few seconds is quite sufficient to achieve a first-class finish. Remove from the lathe and holding the flat spigot on to a piece of sandpaper rub it down to about 1/16 in. long. This flat surface is polished on a piece of paper with a drop of "T" cut, etc. and circular movements. The lenses should now be pressed into the lamp bodies and fixed in place with a *tiny* spot of cyanoacrylate adhesive (IS12). Be careful or you will spoil the optics — use a thin wire to place a tiny drop from the inside.

We now have to make the LED holder (or inside of the lamp). For this we need a piece of perspex, say, 3/8 in. thick which we make into 3/8 in. square blocks 1/2 in. long. Make each a comfortable "slide in" fit into each lamphouse.

Mark out the centre of one side and drill straight through No. 6 drill — open out one side with a letter "H" drill to a depth of 1/16 in. This is to take a standard 0.2 in. dia. LED.

Now drill two small holes as shown, one No. 60

drill and one 0.7 mm. diameter. No apologies for mixing systems!

The final steps are to select the correct polarity terminations on the LED and bend to shape. I suggest that the battery negative be "earthed", therefore we must find the positive lead of the LED. It is usual for manufacturers to make the short lead positive but a test on 3 V using a 22 ohm resistor in one lead will make sure. It won't light the wrong way round.

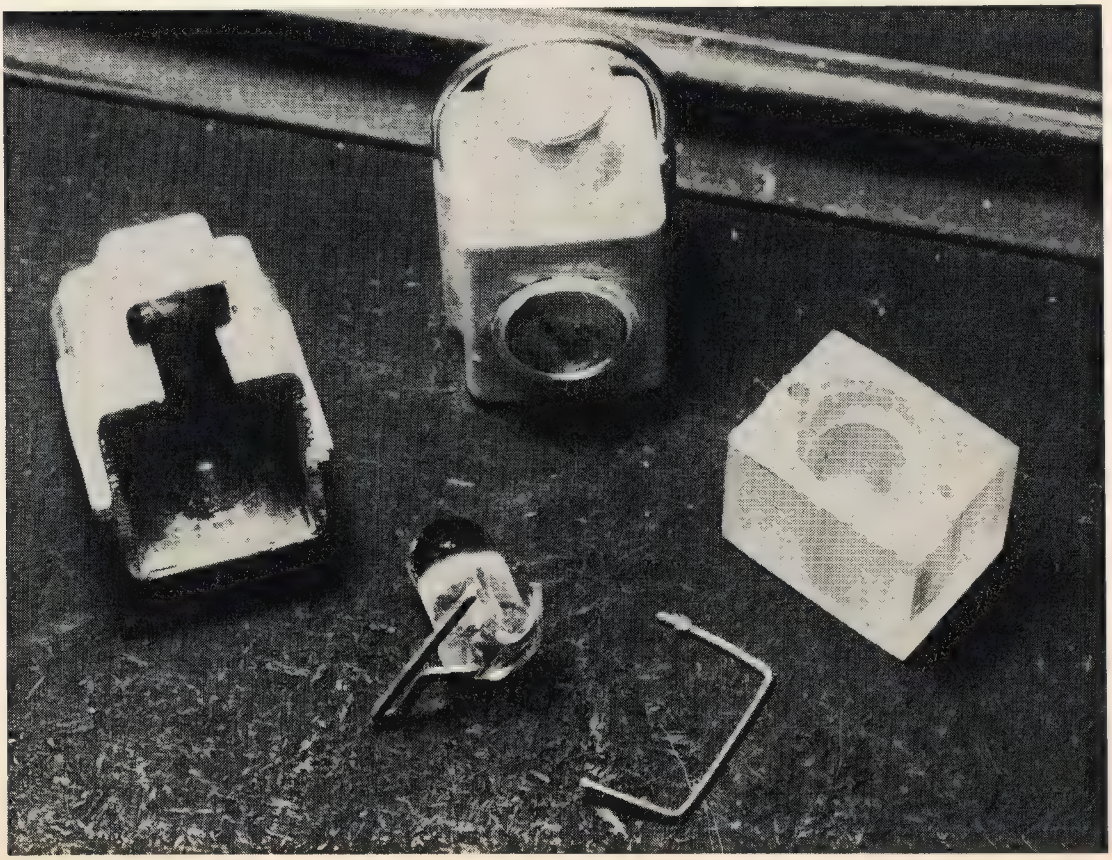
Bend the leads into the shape shown, being most careful to hold each lead as close as possible to the LED with pointed nose pliers to avoid damage when bending. The positive lead must fit into the No. 60's hole whilst the negative lead is trapped between the perspex body and the lamp case as the body is pressed home (relieve the perspex with a file to allow this if necessary). Finally bend a piece of 26 s.w.g. spring steel wire to the shape shown and insert in the two small holes to provide the centre (positive) contact. All that is now required is a coat of paint and a real live test. These lamps only consume about 20 mA and give a very realistic glow.

I have also used a special "high intensity" yellow LED (with a 10 ohm resistor) fitted on the front of my driving wagon. This gives plenty of light in the cab for night running, being positioned to shine straight on the water gauge. There is another battery box fitted to this wagon which runs the tail lamp as well.

A "Kit" of parts for anyone who has difficulty in obtaining bits is available from A.G.W. Electronics Ltd., Hayford Way, Staveley, Derbyshire. The kit contains four yellow LEDs, two red LEDs, six 22 ohm resistors, two metres of P.T.F.E. wire, a piece of double-sided fibreglass P.C. Board and a two-cell battery holder. The price is £2.70. Cash with order. (With sub-miniature switch £3.50.)

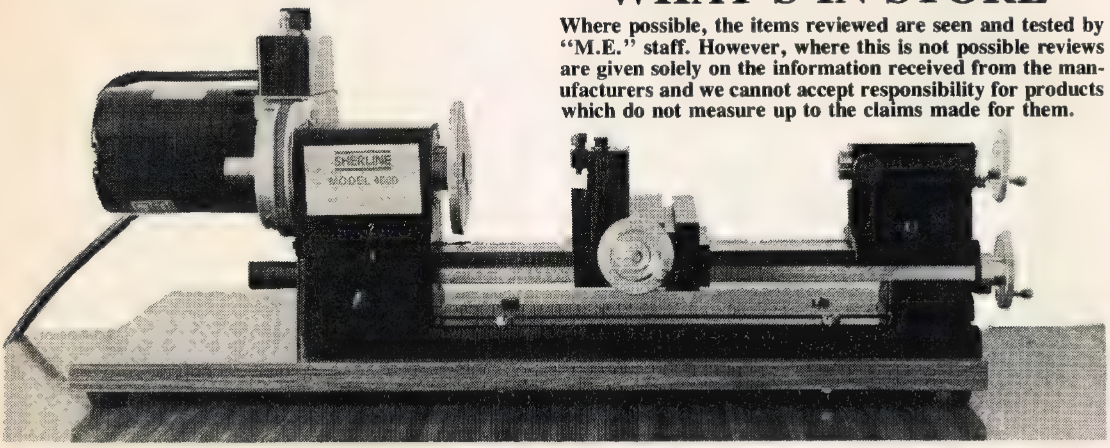
Someone will surely point out that Great Western lamps have a side bracket. Well I have thought about this a little and feel that if a slot is milled for the LED rather than a hole — then the LED could be inserted in the perspex body sideways and the contacts formed in a similar way as already described. However the LED leads would be at one corner rather than the centre so obviously a little more thought is necessary!

"Kit" of parts and completed lamp. L. to R. lamphouse, LED, positive contact, LED holder.



WHAT'S IN STORE

Where possible, the items reviewed are seen and tested by "M.E." staff. However, where this is not possible reviews are given solely on the information received from the manufacturers and we cannot accept responsibility for products which do not measure up to the claims made for them.



THE SHERLINE 4000 LATHE

Despite the often critical remarks by experienced model engineers about small lathes there is no doubt that these so-called "toys" have now reached a popularity hitherto unknown. The reason is more than simply one of cost — a secondhand Myford, for example, in reasonable condition and with a fair selection of accessories could be obtained for little more than the cost of a new small lathe with similar accessories, if you are lucky enough to reach the vendor first. The larger machine is also more attractive in the wider range of operations it will perform, the larger stock it will hold, and, usually, the greater accuracy it will achieve. Against all this, and it is probably the deciding factor, is that not every potential model engineer has access to a workshop where a large lathe can be properly installed. Many prefer the kitchen table approach to their hobby and provided that the limitations of a small lathe are accepted and respected, some fine models can result.

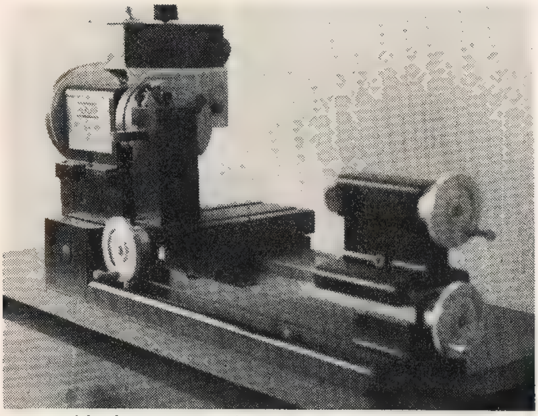
Undoubtedly the Unimat has made most impact upon the small lathe market over recent years although in the U.K. the Perris lathe, now produced by Cowell Engineering Ltd., has earned itself just popularity. Both these designs have been available for many years and by development have reached a high standard of reliability and accuracy. Readers of Rex Tingey's articles on the improvement of the Unimat SL will realise that many of the limitations associated with the small lathe can be overcome, and we know of several readers who have religiously followed Mr. Tingey's advice.

Bearing these facts in mind it is not hard to believe that if a new small lathe is to have any success in this market it would need to be a good one. We believe the Sherline 4000 to be just that. The manufacturers, Sherline Products, are at 1320-4 Grand Avenue, P.O. Box 407, San Marcos, CA 92069, U.S.A., and it is interesting to see that their design embodies many of the modifications Mr. Tingey made to his Unimat, although doubtless this is only as a result of serious thought being given to the design in its early stages. There are facilities for increasing the swing, electronic control for speed, and a vertical mode.

First of all, let us take a look at the specifications of the Sherline 4000. In standard form it is powered by a 1/5 h.p. motor using 115 volts supply. This meant that before we could use our lathe we had to acquire a suitable transformer but we are given to understand that for the European market a 240 volt motor will be fitted on production models. Drive is via toothed poly belt although this does not utilise a toothed wheel. However, although a toothed wheel could be made if required, we found no evidence of belt slip under any loading. Speed control is through an electronic circuit which eliminates the need for belt changing and gives infinitely variable speed from 0 to 2000 r.p.m. although the manufacturers claim the range is from 100 to 2000. The reason for this is that below 100 revs. the drive tends to be a bit lumpy. There is no means of measuring the revolutions but the best speed quickly comes with experience.

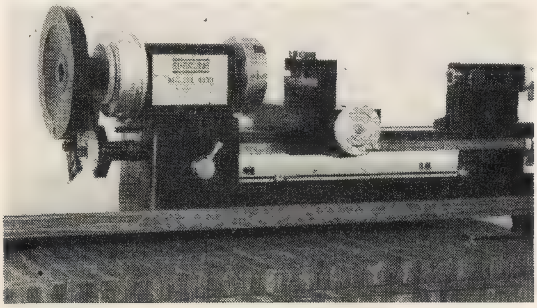
The general dimensions are as follows: swing over bed, 3½ in.; swing over cross slide, 2¼ in.; distance between centres, 8 in.; hole through spindle, .405 in.; travel of cross slide, 2¼ in.; travel of tailstock spindle, 1½ in.; overall length, 18 in.; width, 7½ in. and height, 6 in. The weight is 20 lb. The spindle nose has a thread of ¾ in. x 16 and a No. 1 Morse taper. At the other end the tailstock spindle has a No. 0 Morse taper. The headstock bearings are 20 mm. I.D. x 42 mm. O.D. ball races which are prelubricated and require no further attention in their lifetime. The bed of the lathe is made from brass alloy with dovetailed sides and this is secured to a light alloy base by two Allen screws of differing lengths — a point to note if the bed is removed for any reason. The leadscrew and the cross slide feed screw are fully concealed beneath their respective beds giving excellent protection against swarf. Both screws are 20 t.p.i. which with the handwheels being graduated in 50 divisions gives a feed of .001 in. per division. When using these dials it is essential to note the backlash in the screws — our cross slide feed had .006 in. The cross slide screw is anchored to the cross slide by a small circlip which takes all the load when the slide is being withdrawn. Although there are gib strips for adjustment we found that our cross slide was rather tight and the circlip was forced out of its groove. Eventually — on a Sunday afternoon of course — it broke and a temporary repair was made by securing the screw to the slide by a nut locked in place. Apart from slightly reducing the cross slide movement it worked very well and is still in place. However, attention to the gib strip adjustment would have eliminated the need for this in the first place. It is just a suggestion but we think that one or two spare circlips with the lathe would be a good idea.

Three- and four-jaw chucks are, of course, available and a tailstock chuck is provided with the basic kit although the capacity of this being only about ¼ in. makes the use of large drills and D-bits impracticable without

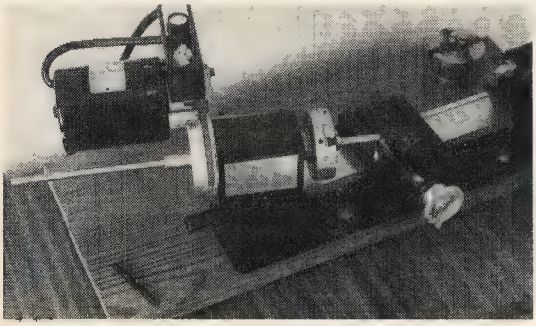


Spacer blocks increase the swing.

The bed removed — note "temporary" repair to cross-slide screw.



Set-up for screw-cutting — note clutch lever.



Head stock swivels for taper turning.

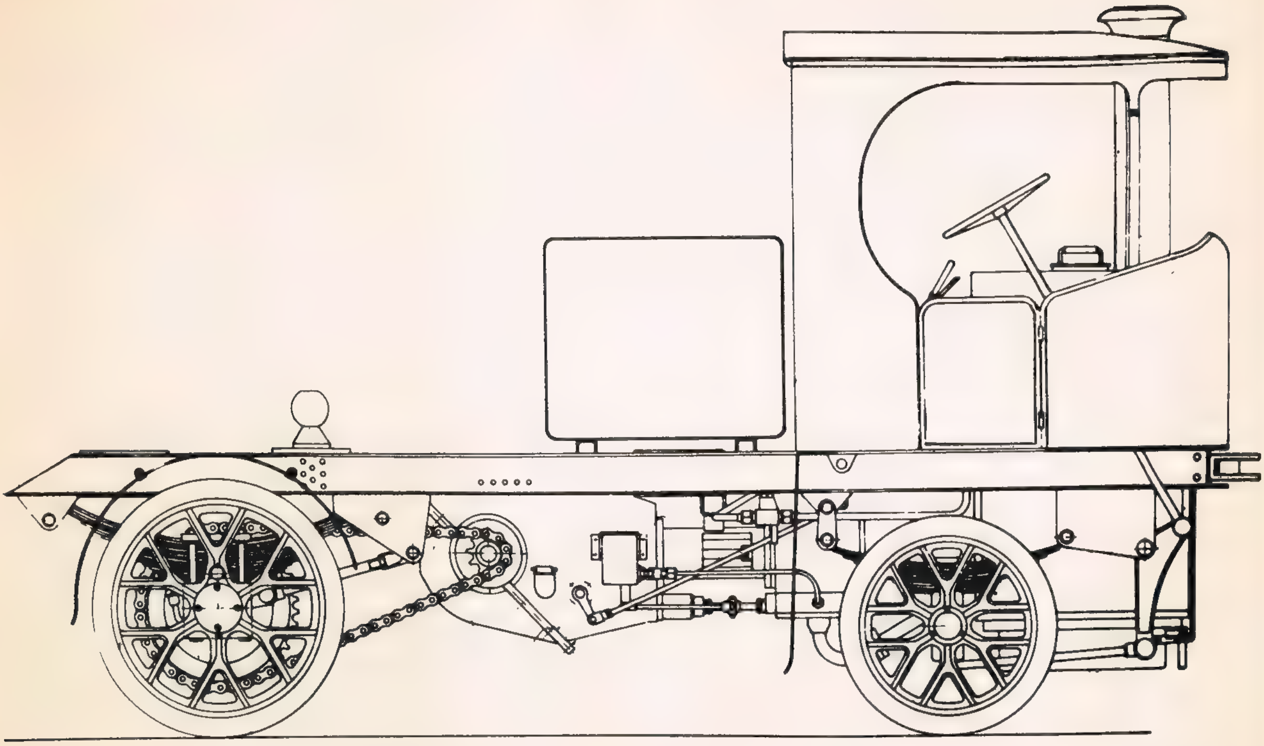
turning down the shanks first — a practice calling for accurate setting up. The maximum capacity of the three- and four-jaw chucks is about 3 in. with the jaws reversed but this can still help when the increased swing mode is in operation. The latter consists of a block under the head-stock and an extra height toolpost. Ours, we found, made the tool point about 25 thou above centre so a bit of adjustment will be necessary here. With this facility the swing is increased to 5 in., holding items of this size may be difficult without chucking pieces.

Screw-cutting on the Sherline is by the addition of back gear which necessitates removal of the motor and control unit so that this operation can only be carried out by hand turning. It also means that an Allen screw under the head-stock has to be removed in order to fit the gear train and if the lathe has been mounted on a bench it will have to be taken off. This can become a bit irksome and it is obviously better to try to arrange a session of screw-cutting to achieve as much as possible at one time. We mounted our lathe on a separate board and screwed four rubber feet to the underside. This holds the base firmly on the bench but a modification to this would be the use of wing nuts instead of hexagonal so that removal of the lathe is facilitated. The wheels included in the kit are 100, 127, and 50 fine pitch, and 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, and 40 coarse. A chart included with the set gives at a glance the combinations possible and one can see that with the 127 wheel metric threads can also be cut. The range goes from 10 to 80 t.p.i. Careful setting up of the back gear is necessary to ensure good meshing of the fine tooth wheels.

In the normal turning mode, feed of the tool is by hand but a power feed can be fitted using a separate motor which couples through a clutch to the leadscrew. Feed, from right to left of course, is at a rate of 1 in. per minute. We did not have this facility to try but we found no fault with the hand method once the revs. of the lathe had been set. In fact when we somewhat cruelly turned a piece of 2½ in. dia. cast iron of doubtful origin we found that hand feed, using a very sharp tool and taking the feed very steadily, was the best method. Overloading the lathe by too much feed causes the motor to stall and overheat and is a practice to be avoided. On phosphor bronze the chips flew in a very satisfying manner and we used the lathe to test A. J. Reeves's "Minnie" conversion castings, the result of which can be seen in 7 July issue. Similarly, silver and other steel rod turned easily. Taper turning is easily accomplished by slackening one Allen screw on the side of the headstock, removing the locating key, and turning the headstock to the correct taper indicated by a graduated dial. Conversion to a vertical milling machine is also possible.

Prices are difficult to state as import duty tends to add amounts out of all proportion to the cost. Our lathe cost £44.60 to bring into the country but with an agent having his own import arrangements this could be considerably reduced. The prices we have at present indicate that for the basic lathe in imperial dimensions — that is including motor — the cost is $219.50. A metric version is available, the 4100, at $229.50. Much better to buy the 4000-A which comprises the lathe, tailstock chuck, No. 1 Morse Arbor, three-jaw chuck, for $279.50. This is sufficient to get started and other pieces can follow. For example the screw-cutting attachment costs $89.95 and the vertical milling column $59.95.

When we hear further news of U.K. agencies we will publish the details but meanwhile enquiries to the company will produce full literature. In summing up we would suggest that the Sherline 4000 offers a high standard in small lathe design and construction with facilities usually associated with the larger machines. Possibly the lathe in our possession is at present the only one in this country — we believe that before long there will be many more.



CLAYTON UNDERTYPE STEAM WAGON

to 2 in. scale

by Robin Dyer

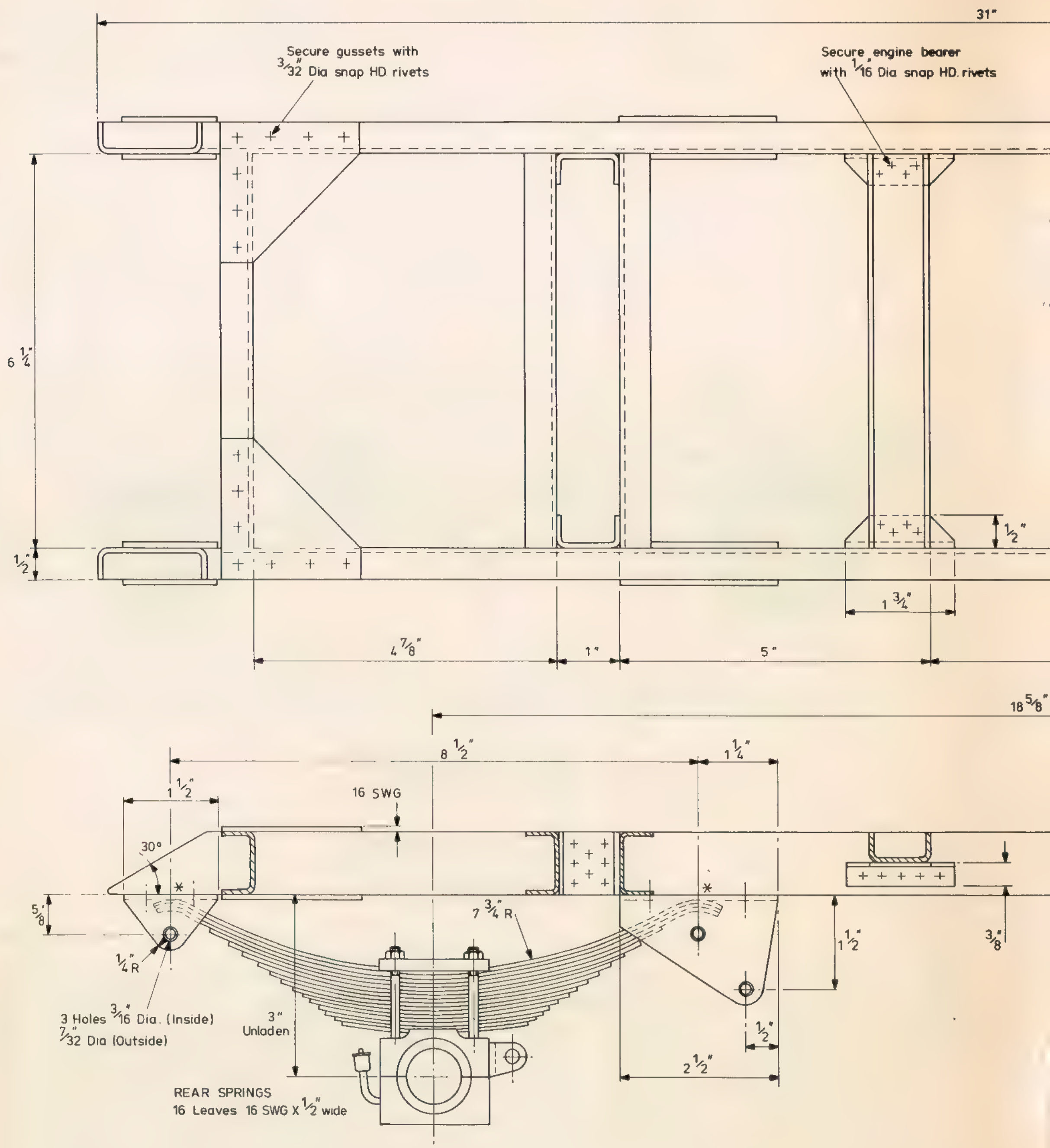
Part II

From page 835

THE CHASSIS OF our Clayton wagon is the backbone on which all the other components are mounted. The chassis of the full size wagon was constructed from 6 in. x 3 in. steel channel and since this comes out at 1 in. x 1/2 in. for the model it seems reasonable to make use of 1 in. square steel tube. K. R. Whiston of Stockport can supply 1 in. square tube with a wall thickness of 18 s.w.g. Although this is a bit thin it would do. I have used 1 in. x 16 s.w.g. in my model, but those builders with access to a press brake can go to town and fold their own channel from 14 s.w.g. or 2 mm sheet.

Assuming the use of square tube, the total length required will be about 9 feet. Cut two lengths sufficient for the longitudinal members of the chassis and scribe centre lines down two opposite sides. Check where the weld is and arrange to have this in the scrap piece. With a new blade mounted sideways in the hacksaw frame saw down the length of the tube. Take it slowly, aiming to keep the scribed lines just visible on one side of the saw slot. I found the process much easier than I thought it would be, and more accurate than using my bandsaw, the blade of which tends to wander. Clean up each new channel section with a smooth file and then repeat the process for the crossmembers. Each crossmember except the front one is 6¼ in. long.

Finish off one end of each side member at 30 degrees, as shown on the drawing, observing that you should now have a handed pair. Place these channels back to back and scribe across the top flanges the positions of the leading edges of all the crossmembers, and scribe across the lower flanges

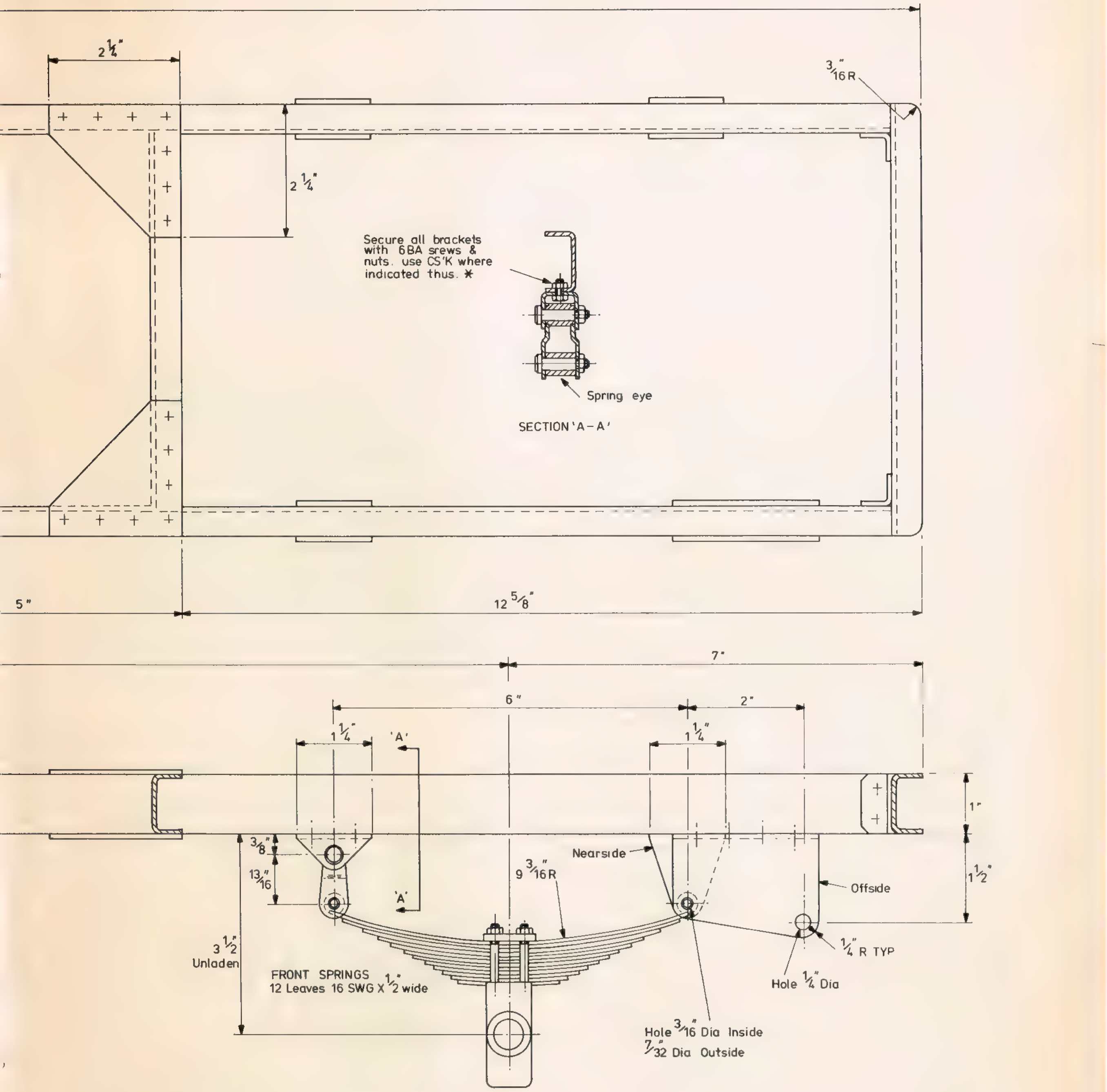


the positions of the leading edges of all the various brackets.

Eight gussets are now required, triangular in shape, to hold the main parts of the chassis in place. I made one gusset complete and used it as a template to mark out the other seven, then clamped each in turn to the master for drilling.

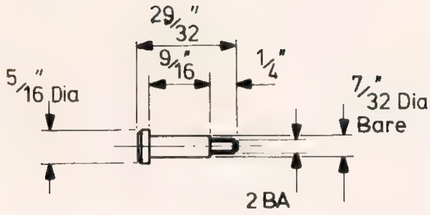
A start can now be made on assembling the chassis, and for convenience I will number the cross-members one to six, starting from the front. There is a lot of clamping, spotting through and dismantling to be done, and I found a Mole self-grip wrench an invaluable aid. It makes a very useful third hand.

Clamp a side member in the vice, upper flange

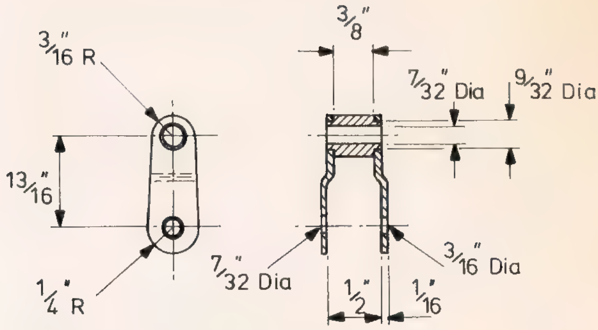


uppermost and clip a gusset in position where crossmember No. 2 will come. Drill through a couple of the holes and clamp the gusset with 7 BA screws and nuts. Do the same with the underneath gusset ensuring that both of them are square and in line. A crossmember can now be clipped in place, drilled and screwed up ensuring that it is really square with the side member. The whole process should now be repeated for crossmember No. 6.

Take the other side member and assemble the remaining gussets using the scribed lines as guides. The two parts of the chassis can now be clamped together ensuring that they are parallel and their front edges are in line; hold the front crossmember



MOUNTING PIN 12 Off. M.STL.

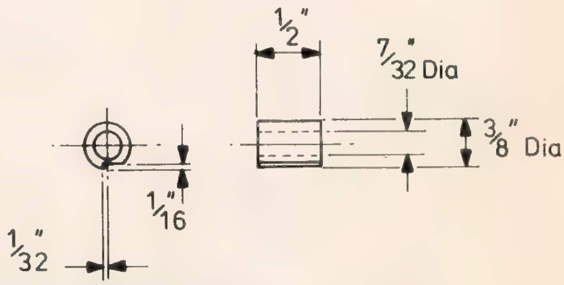


SPRING SHACKLE 2 Off.
M.STL. Fabrication.

in position and check with a square. Finally, drill through the gussets into the crossmembers and bolt up with temporary screws. It would be best to assemble the front crossmember next, using 1/2 in. x 1/8 in. steel angle or angles made from pieces of the square tube. Check that the 6¼ in. spacing between the longitudinals is maintained. The other crossmembers can now be positioned at their various stations and the whole chassis may be riveted up with the exception of crossmembers 2 & 3 which have yet to be drilled for engine bearers. A special dolly will have to be made for holding up the 3/32 in. dia. rivets which secure the gussets since it has to fit between the chassis flanges. I personally dislike riveting as I can never raise a decent head, but the Clayton chassis was liberally sprinkled with neat snap heads and so our model ought to follow suit.

We now need eight U-shaped brackets of various types to house the spring ends, radius rod ends, and, at the front offside, to form a mounting for the steering bell crank. I found the easiest way to make these was to fold the 16 s.w.g. sheet around something 1/2 in. thick, tapping down tight and flat, and then, using the scribing block, mark the outline of the bracket and hole centres. Note that all the brackets have their outer flange drilled larger than the inner flange. This is so that the mounting pins can be clamped up tight. All the brackets are secured to the chassis with 6 BA screws and nuts. Note that certain screws are countersunk where the ends of the rear springs bear. Use the previously scribed lines to position the brackets. The front brackets although of different shapes, must have their spring mounting holes in line, otherwise the front axle will not be square with the chassis. Pass a straight length of 5/32 in. dia. silver steel through the holes after fixing one bracket and square it with the chassis before securing the other bracket. It will not be such a disaster if the other brackets are not exactly in line since they are not used as positive locations. The position of the rear axle is adjustable; like the rear wheel of a bicycle it can be moved fore and aft to adjust the tension of the chain.

As a change of scene we can now remove the dust sheet from the lathe in order to make the twelve mounting pins using 5/16 in. dia. M.S. bar. For a "production" run such as this it will obviously pay to set up as much as possible to ensure a repeatable product and to cut down manufacturing time. Whilst at the lathe it might be as well to make the four front spring eyes, and the two spacers which form part of the spring shackles. Also, turn up a little stub mandrel with a 2 BA thread on it, and use it to skim twelve 2 BA nuts to 3/32 in. thick. These nuts are used to clamp the mounting pins in their brackets.



FRONT SPRING EYE
4 Off M. STL.

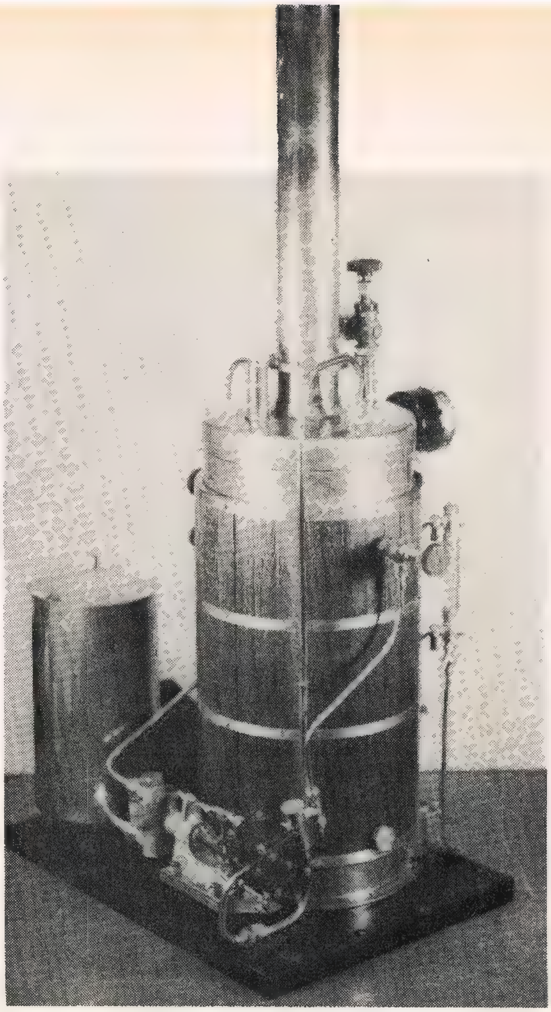
Silver solder to top spring leaf.

The spring shackles are made from pieces of 16 s.w.g. steel. Leave them oversize at first, whilst putting in the joggle, then mark out the shape, drill the holes and file to the outline. Drill both lower holes 3/16 in. dia. to start with, then a piece of 3/16 in. dia. aluminium rod can be put through to hold the parts in line whilst silver soldering to the spacer. Easyflo silver solder paint would be useful for this job.

To be continued

A FIVE-INCH SHOP BOILER

by 'Tubal Cain'



Rear view of the finished boiler showing the lagging, steam feed pump and feed-water tank.

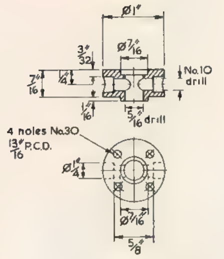
HERE IS THE larger boiler I promised when describing the little three-inch some while ago (Vol. 143, No. 3555). It is slightly modified from one I built about five years ago, and *that* one was a fairly considerably modified edition of the LBSC design of 1950, sometimes known as the "M.E. Test Boiler". Incidentally, the M.E. drawing supplied by the plans department differs from that shown in the *Model Engineer* at the time, so that I'm not the only one to make alterations!

To start at the beginning, the main differences between my arrangement and the original are first, the number of tubes has been reduced. Partly because it was difficult to get the last four in — LBSC used only 16 gauge shell tube, and I have used 13 gauge — but also because as originally drawn the steam take-off for both blower and steam feed-pump (or injector) would have been within 1/16 in. of a steaming firetube, and water carry-over would have been inevitable. Secondly, I did not like the "Steam Fountain" arrangement; in fact, the dimensions given would not have worked anyway, but I wanted a boiler that might — from a distance, perhaps — look like the vertical boilers which were common in my youth. On technical grounds, too, it is a mistake to site the safety valve so that it draws steam through the superheater. As soon as the valve blows off, you will lose some superheat due to the added flow through the tubes. Third, I altered the run of the superheater tubes to give a more flexible assembly, so making it easier to get a good joint at each end; this was, in a way, a consequence of the second modification, as the new layout involves two flanged joints.

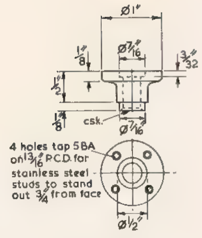
There were a number of other minor alterations which I need not detail, and a few more I have put in since I made the boiler. The drawing shows the layout. The safety valve now projects through the boiler top, and is located on the wet header of the superheater. The dry header is a block attached to the inside of the shell in what might be called the "smokebox", and the main steam take-off rises from this, also passing through the boiler top. Connections for blower and steam-pump steam are on opposite sides of the boiler, taking wet steam (essential if an injector is used) and the pressure gauge also is located in the shell. The superheater tubes emerge from the wet header sideways, and are swept round almost in a half-circle to bend down into the flue. This gives just a slight amount of available spring and so reduces the difficulty of ensuring that both flanged joints lie flat.

I used a "Stuart Turner" direct acting steam feed pump mounted on a bracket at the back of the boiler shell, with the exhaust turned up the chimney. I prefer this for two reasons. First, it's a nice little bit of "works" to have around, and can be controlled in feed rate to a nicety. Second, a hand feed pump can be set in series, the steam pump drawing through the hand-pump valves, or the hand-pump driving through the steam without difficulty. I thought that if I tried to fit a hand-pump on the suction of an injector there might be problems with lift. It is true that all the energy in the steam used in an injector is returned to the boiler, but on the other hand, the pump exhaust does augment the draught!

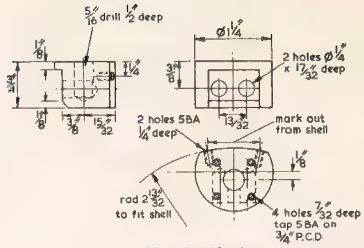
The design is intended for coal firing, but I frequently use it on propane, using a Sievert "neck tube" type torch. This type of burner has the air-



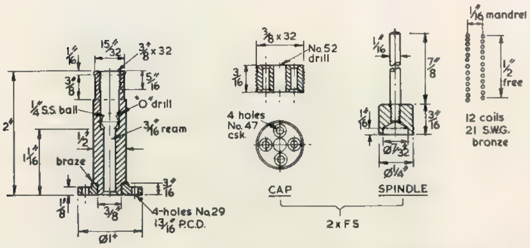
WET HEADER drawn gm
one off



WET STANDPIPE drawn g.m
one off

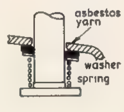


DRY HEADER: drawn g.m.
one off

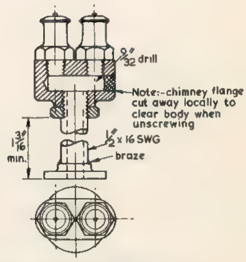


BODY

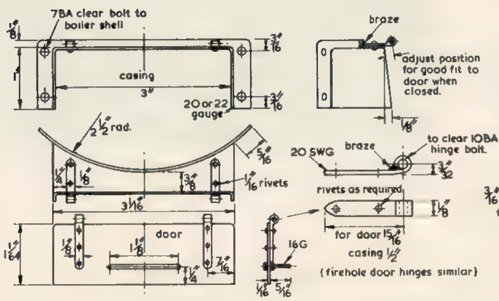
SAFETY VALVE: phos bronze with stainless ball



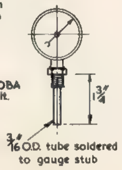
AIR SEAL AT HOLES IN BOILER TOP

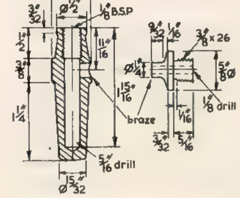


SUGGESTED ARRANGEMENT WITH TWIN LOCOMOTIVE TYPE VALVES.

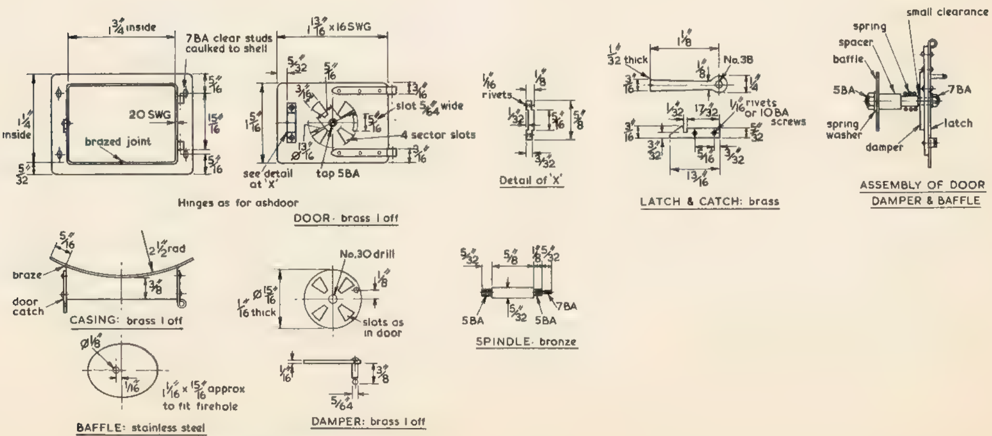


ASHPIT DOOR: brass 1 off

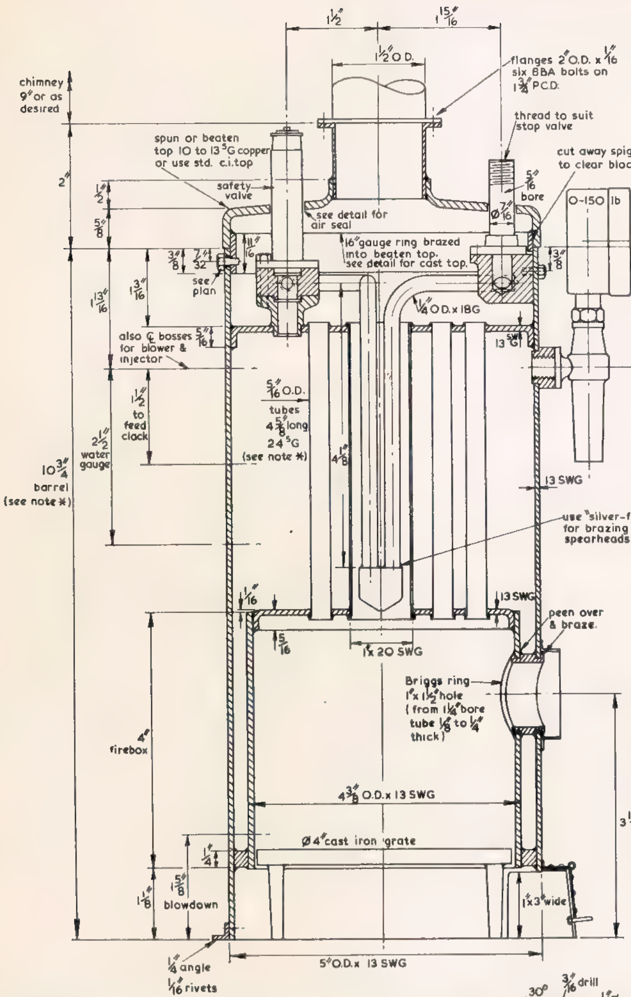


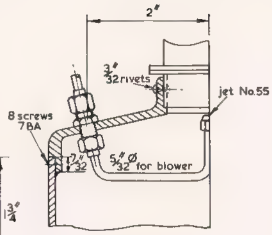


PRESS: GAUGE SYPHON: brass 1 off

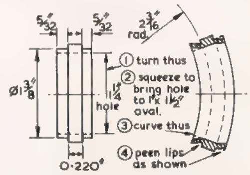


DETAILS OF FIRING DOOR



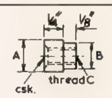


Detail for cast top & how to fit blower & steam pump exhaust unions.



FIREHOLE RING copper

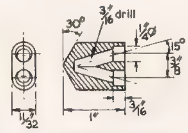
* Note These dimensions may be increased by from 1″ to 1¼″ if desired. Adjust superheater to suit.



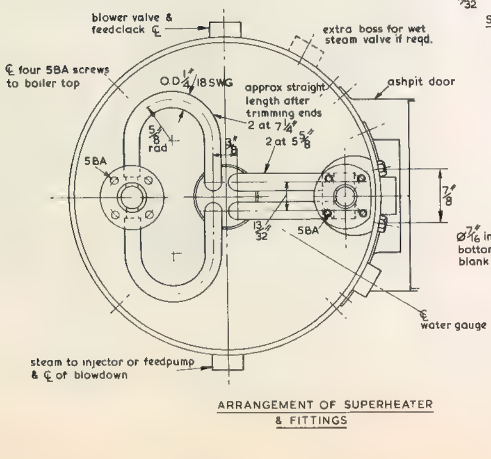
Qty.	A	B	C	Fitting
2	7/16″	5/16″	3/16″*	blower and injector valves
2	½″	7/16″	¼″*	water gauge
1	½″	7/16″	5/16″-26	feed clack
1	5/8″	½″	3/8″ 26	press gauge
1	5/8″	½″	3/8″*	blowdown

* Pitch to suit fitting used.

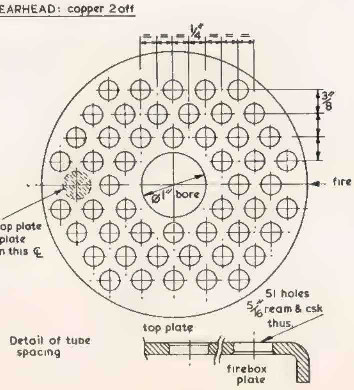
Ferrules, copper or phos. bronze.



SPEARHEAD: copper 2 off



ARRANGEMENT OF SUPERHEATER & FITTINGS



Detail of tube spacing

holes well back from the flame-tube and needs much less secondary air than the usual "blowlamp" type propane burner. I have a very jury-rigged stand which holds the burner assembly with the flame-tube just inside the firehole door, cocked at an angle so that the flame points downwards and sideways, directing the heat towards the bottom of the firebox with the flame circulating round it. Not ideal, but it seems to work well enough. I have been meaning to make a sort of gas-ring adaptation to the neck-tube, but if this were fitted it would mean that the plant could not be used on solid fuel. The grate is a standard cast grate available from advertisers. My own boiler top is beaten and spun from thick copper, but again the standard cast top can be used; the drawing shows both.

Boiler Shell

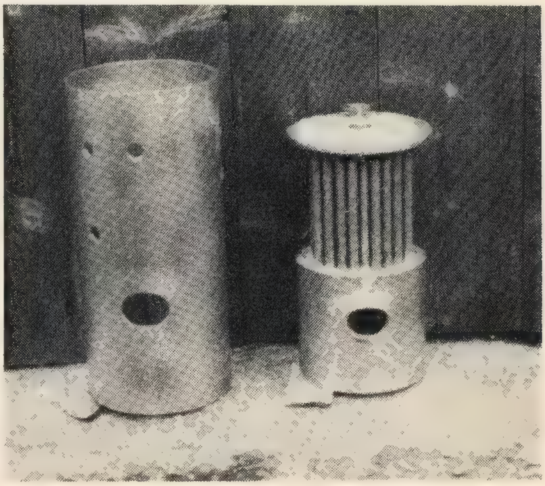
I suggest you make the firehole ring first, as you will need this to mark out the holes in shell and firebox. If you can get it, use a piece of 1¼ in. or 1⅜ in. bore tube which is 3/16 in. or even ¼ in. thick though the usual 1/8 in. thick as used for loco boilers will serve if naught else can be had. The point here is that the firehole is in a circular shell, not in a flat plate as on locos, and the firehole ring should be thick enough to compensate for the metal removed in making the hole. A 1/8 in. thick ring won't do this; 3/16 in. is better, and 1/4 in. thick is best. However, the stresses are so low that no harm should follow the use of the standard material and I only mention the matter in case anyone reading this should be a Lloyd's Inspector! Turn the lips on the end in the usual way, carefully squeeze flat till it is about 1 in. x 1½ in. oval, and then curve it in the other plane to fit the shell and firebox. This isn't easy. Make two wooden formers, one with a convex surface at about 2 in. radius, the other former concave at about 2 9/16 in. radius (these dimensions allow for the lip on the ring) and, after thoroughly annealing the oval ring, set these blocks between your vice jaws and gently squeeze the ring between. It should deform without another annealing, but don't hesitate to re-anneal if it shows signs of getting stiff. When this is done, the lips will be a bit distorted — and in any case will have bowed inwards and outwards, so carefully peen the lip to the shape indicated on the drawing, i.e. with the lips parallel to the ring centreline. You can now make a rubbing of the lips to help you mark out the holes.

Now, before we go any further, you will see that on the drawing I have recommended that you use a longer shell and tubes than I did. I find the flue-gas temperature a bit high, indicating a low efficiency, and this is because the original tube length of 4⅝ in. is too short. (The M.E. drawing has them shorter still.) An added advantage of the increase in length is that you will have a larger water-content, making feed adjustment less critical. The boiler is a very fast steamer from cold, but it must be accepted that the water level can shift very quickly! Don't forget to lengthen the superheater elements as well.

Cut off the shell tube to the desired length, turn up a couple of wooden plugs a good fit in the ends, chuck one end and with a sharp knife and plenty of soluble oil trim the end. Reverse and do likewise for the other end. Whilst you are at it, use your scribing block to mark out the various centrelines whilst the tube is in the lathe. Reduce the diameter of the wood plugs, and treat the firebox in the same way.

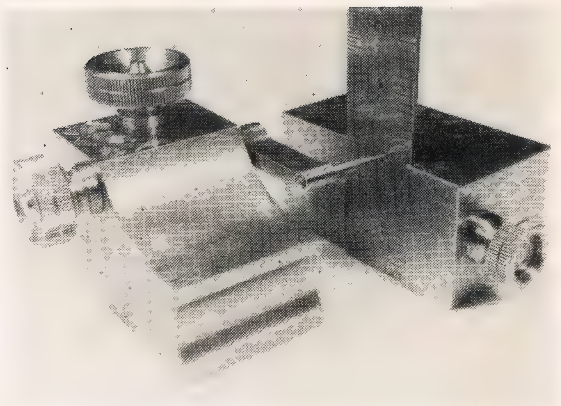
At this stage you must decide on what fittings you are going to use — or need, for that matter. Apart from the pressure-gauge syphon and the feed-clack, mine are all commercially made, and though a little overscale and the valves have rather ugly fibre handles (apart from the one I made for the feed-clack), they work very well. However, I *never* use the brass bushes supplied with such, and have indicated the sizes in copper or phos bronze on the drawing. You must alter these to suit your own fittings. Incidentally, if you are likely to need the boiler for *testing* injectors, fit a further steam take-off on the boiler shell. Having done this, you can mark out for and drill the holes in the shell. The holes for the fire-door ring must be marked out pretty carefully, so that the firebox lies in the correct vertical position within the shell; cut the hole a shade small, and file out till the ring is a good fit to the holes. Cut out the aperture for the ashpit door as shown.

The brazed-up tube assembly, together with the shell.



To be continued in 15 September issue

A SCRIBING BLOCK FOR SMALL WORK



by Geo. H. Thomas

THIS IS SOMETHING simple for the beginner to make; no patterns, no castings, just a few short ends of mild steel and all the work done on a lathe with a vertical slide. Mine was made a long time ago and has been in regular use ever since though I tend nowadays to use a height-gauge for accurate marking out because it can be set to any odd decimal dimension but this little scriber is quicker to use when nominal fractions (or millimetres) are being marked off and, given a suitable rule, it is just as accurate.

Some of our older readers might see a family resemblance to a tool which was described in detail many years back by "Duplex" (1948, repeat 1966). I made one of these — still have it, in fact — but it suffered from two drawbacks. I found the range at ⅛ in. to 1⅛ in. was rather too small but, much more serious, the locking device seemed to be incapable of holding the spindle from turning unless the arm was somewhere near the horizontal position; if the setting was, say, 45 deg. or more above the horizontal, the drag on the scriber point would frequently pull the arm downwards and alter the setting.

The fault lay in the design of the locking cotter which had a completely semi-circular recess in the side as a result of which the locking pressure was applied directly to the underside of the spindle which gave no multiplication of the force by wedge action. (In case any readers look up the articles in question and find that the drawings do not bear out the above statement, I hasten to add that the "pictures" do not agree with the dimensions). This lack of clamping pressure was aggravated by the small size of the knurled nut. I tried altering the shape of the recess in the cotter in order to provide some degree of wedge action against the side of the spindle. This showed some improvement but resulted sometimes in a small movement of the arm due to the drag of the cotter after it was in contact with the spindle.

The requirement, clearly, was for a locking device in which the clamping forces were balanced out in both directions and in which there would be no movement of any part in contact with the spindle. This involved making a completely new scriber so the range was extended to cover ⅛ in. to 1 13/16 in. as shown in Fig. 1.

I hardly need to say that the scriber is used in conjunction with a rule rigidly clamped in a holder: see Fig. 2. I was fortunate in that I had a thick Brown & Sharpe rule having fine, but deep, graduations into which the scriber point could be "clicked". This is styled "Tempered No. 7" and is probably unobtainable today but there should be plenty of comparable rules.

It will be seen from the G.A. drawing that a two-part pad-bolt is used; quite a common form of clamping device but unusual in that a spring is incorporated which has the effect of pulling the top pad down on to the spindle, through the medium of the nut, and pressing the lower one up, even when the locking nut is released. As drawn, the ¼ in. dia. portion of the locking bolt is hard in contact with the lower pad and applying clamping pressure from the screw. Upon releasing the nut, these faces will separate a trifle but the spring pressure will remain. This arrangement provides the necessary friction to hold the spindle until it is locked and, as there are no slacks to be taken up there is no movement of the clamping elements when the lock is tightened. It has proved to be completely satisfactory in use

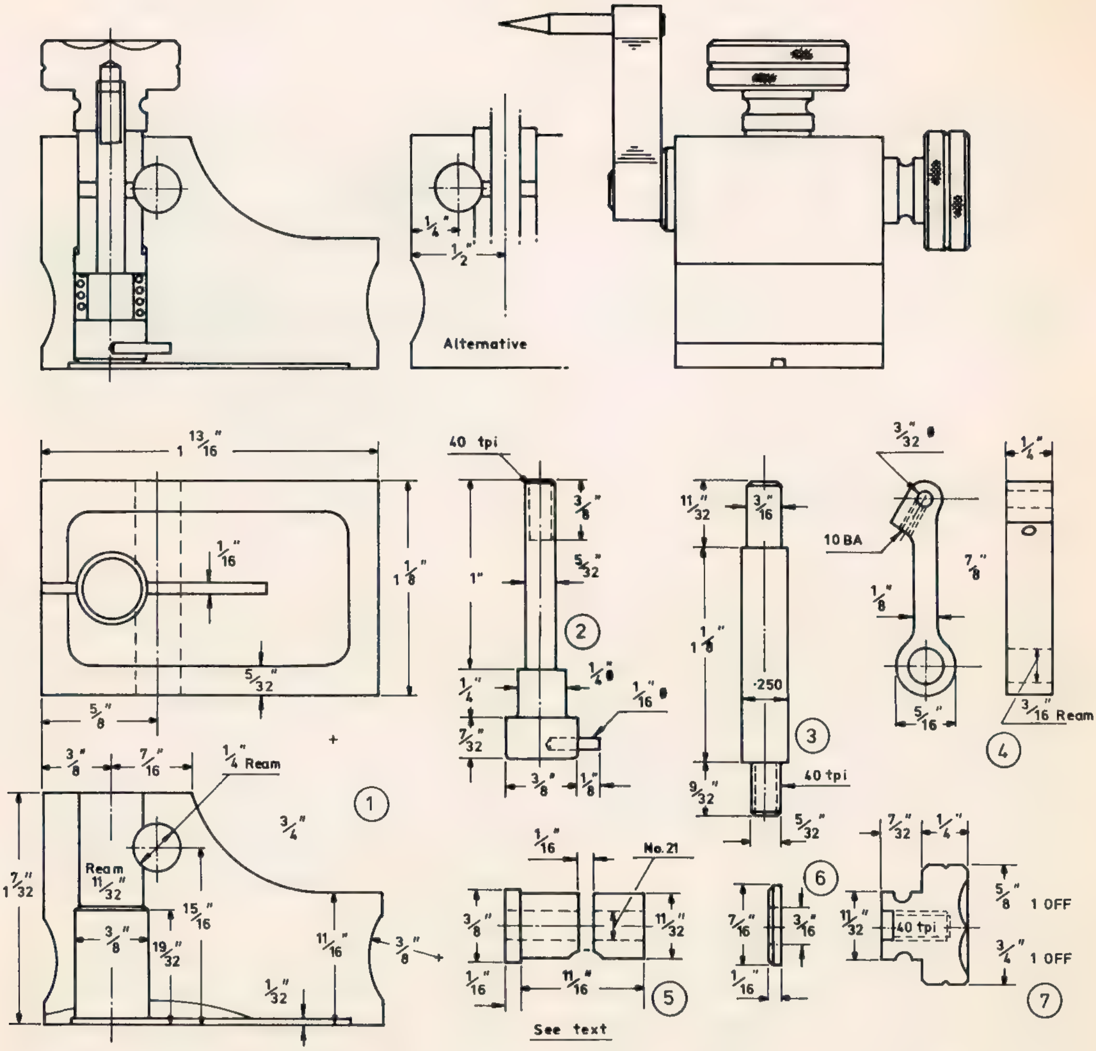


FIG. 1

and the little extra work involved has been well worth while.

In order that the drawings should agree with the photographs, they show the scriber exactly as it is but I am of the opinion that it would be easier to use if the positions of the two bores were to be changed as indicated in the scrap view. This would provide for better visibility; furthermore, the spindle (3) with arm (4) could, if desired, be assembled from the other side of the block. The method of assembly will depend largely on whether the user is "right-eyed" or "left-eyed" which is easily tested — no changes in any parts are necessary.

The shape of the block can be anything to suit the maker's fancy; the drop away towards one end helps the appearance which would be too "chunky" without it. Mine was milled, probably with a 1½ in. dia. shell mill but a somewhat similar curve could be applied by clamping the block to the face-plate on a packing piece and turning away the unwanted metal; a sweep of about 1¼ in. radius would probably prove satisfactory. The shallow recess in the underside makes for freer movement on the surface plate and the 1/16 in. slit serves not only to hold the snug in the locking bolt but provides also an opening to the outer air which probably makes it easier to pick up from a surface-plate. In the making of the tool there is nothing that is likely to present any real difficulty; although it is capable of doing accurate work, there is no inherent accuracy in the tool itself. Good fits of all moving parts will be obtained if holes are reamed and the mating male parts made dead to size by mike. This is my usual practice for such jobs and provides an average working clearance of approximately half a thou as well as saving much time as compared with

the cut-and-try method of working.

A word or two about the making of the split cotter might be of help to some of our less-experienced readers. After squaring up the block and marking out, machine it complete except for the ¼ in. reamed hole for the spindle. The cotter blank is turned from ⅜ in. b.m.s. the end being reduced to 11/32 in. dia. (−.001 in.) for a length of 21/32 in. *not* 11/16 in. as shown on the drawing. Drill the centre hole No. 21 (or 4 mm) for a depth of 1¾ in. and part-off leaving about 1 in. or so of parent ⅜ in. bar for subsequent holding purposes. Assemble the blank into the block from the underside, drop a washer having a ⅜ in. hole and about 1/16 in. thick over the top of the cotter which, if things have gone right so far, should be standing about 1/32 in. proud. Now clamp the whole assembly firmly, using a piece of 5/32 in. rod screwed 4 BA at both ends but before applying the top nut, place a thick washer having a 5/32 in. hole over the top of the stud. This second washer will sit on the first one and will transfer the clamping pressure to the block, leaving the cotter blank clear at the top. A sketch of this set-up is given in the top L/H corner of Fig. 2. Now drill and ream the ¼ in. hole which will cut into the side of the cotter blank; it is important that the ¼ in. dimension between the two bores be adhered to.

Remove the blank and hold in the chuck by the ⅜ in. dia. Turn back the little shoulder increasing the length of the 11/32 in. dia. portion to 11/16 in. as shown on the drawing; next, with a 1/16 in. or thinner parting tool, part off the end portion of the cotter, cutting through the centre of the curved depression (see 5) and then part off the lower portion, leaving the head, or flange, 1/16 in. thick. Finally turn this latter part round in the chuck and skim the parted face against which the bolt will pull. Another way in which the blank could be held in place for the side drilling and which some workers might find simpler is as follows: When making the blank, omit the No. 21 hole but turn down the end of the bar to .184 in. for about ⅜ in. and thread 2 BA. This will avoid having to drill a long hole down through the bar and improvising a long 4 BA stud. The scheme is shown in a scrap view in Fig. 2. Upon returning the blank to the lathe, the screwed end can be turned away and the 21 hole drilled about ⅞ in. deep before finish turning and parting off the finished parts.

The arm (4) was profile milled complete on the small rotary table which was described in Dec. '76 and Jan. '77 but in the absence of this or an equivalent, it could be produced by filing. The scriber, which is not detailed, is made from 3/32 in. silver steel with the end turned to a very fine taper over a length of about 5/16 in. After hardening and tempering to a light straw colour at the tip, it should be set running truly in the lathe and with a few very light strokes of a *fine* "India" stone, produce a tiny end cone of about 60 deg. included angle. While I was about it I made three, so spares are instantly available when one becomes blunted. The washer (6) is slipped over the end of (3) before pressing on the arm (4), It would probably be easier to stick the arm on using Loctite 35 or 601, thus dodging the accurate working demanded by a press-fit on 3/16 in. diameter or the fitting of a 1/16 in. taper pin. The spring which is in use at the present time consists of five complete turns (with ends ground flat) of 19 swg (.040 in.) wire wound on a 7/32 in. or 15/64 in. mandrel and having a free length of 11/32 in. to ⅜ in. I have refrained from putting tolerances on the drawings as some workers find them somewhat off-putting, so there might be a few anomalies such as: width of block 1⅛ in., length of item (3) between the shoulders 1⅛ in. Common sense dictates that there should be a few thou of clearance.

Rule holder

A suitable rule holder for use with this little scribing block or, indeed, any scribing block is shown in Fig. 2. We need a 2 in. length of 1 in. square b.m.s. and a few scraps. Again, the drawings show the device exactly as I made mine, with one face milled back to leave a clamping ledge. Those readers who made the special end-mill to undercut the grooves for parting-off blades will now find another use for it here. One could avoid this milling operation altogether by attaching a piece of steel ½ in. wide by about 3/32 in. thick by means of screws or rivets and such a construction would undoubtedly suffice but I prefer the "cut from the solid" method.

Apart from squaring the two ends of the block by turning, the rest of the squaring up can be accomplished by filing. Mark out for the hole on the end where the slot runs out; set up in 4-jaw chuck with the dot running true and drill through No. 12. Open this up with a ⅜ in. drill to a depth of 1¼ in. to the lips. Next mill the face back to a depth of about .080 in. to .090 in. and undercut, leaving a witness of about 1/32 in. Now carry the centre line round from the end and mark the C.L. of the slot. If you have already finished the scriber it could be used now, together with some temporary rule clamping arrangement, to scribe lines 5/32 in. above and below the centre line. Mill the slot with a ¼ in. slot drill or end mill, feeding the cutter through the centre first and then clean up the two sides to dimension and to a total depth of 9/64 in.

The clamping piece (5) is an interesting item and I will describe the method I employed to make it a perfect fit in the slot. Face the end of a piece of ⅜ in. b.m.s. rod and drill a ⅛ in. hole to a depth of about ⅝ in. Remove from chuck and clamp it in the tool post square on to the lathe axis. Mill a flat on one side for a distance of about ⅝ in. removing exactly 1/16 in. which will be determined by using the

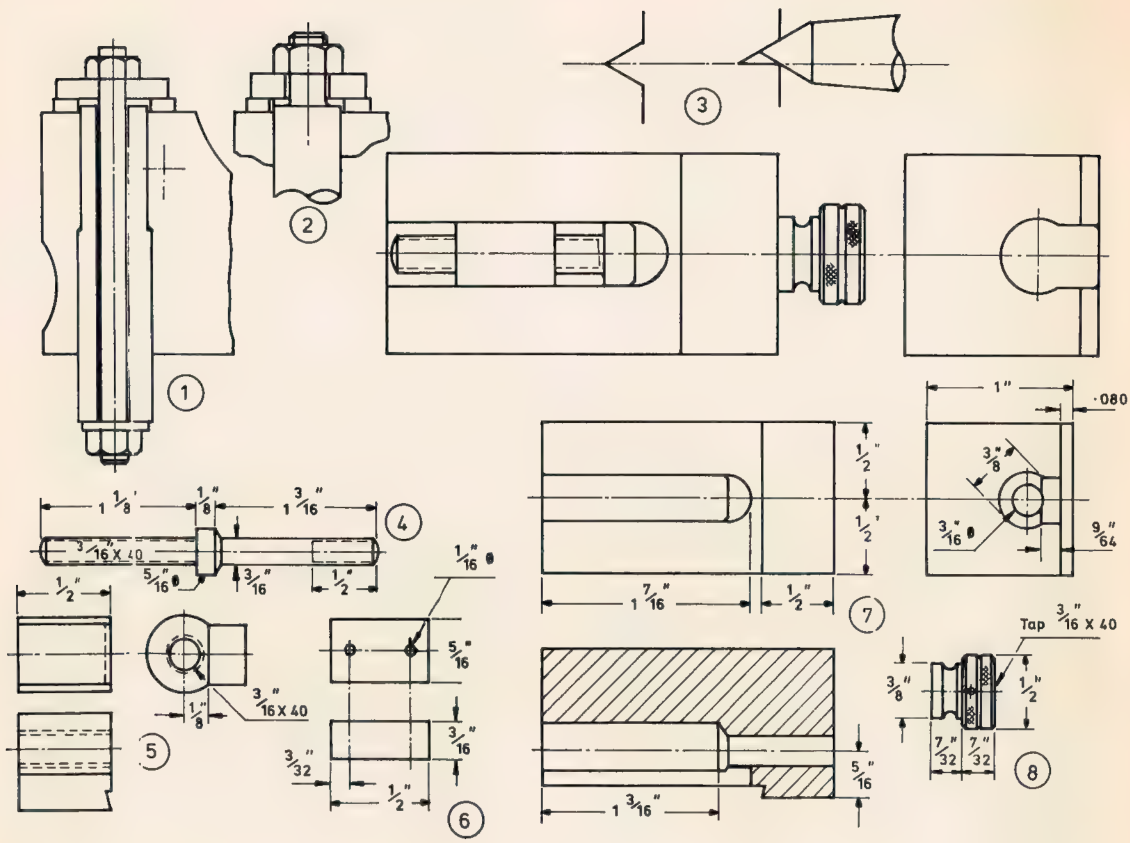


FIG. 2

leadscrew or the topslide screw for feeding in. Return to lathe and part off ½ in. long. Next prepare a ½ in. length of 5/16 in. x 3/16 in. b.m.s., the 5/16 in. dim. being a nice close fit in the slot, and drill two 1/16 in. holes as indicated at (6). Slip the round piece into the hole with the flat uppermost, drop the little block on to it and secure it in position with a small toolmaker's clamp, leaving one of the 1/16 in. holes clear. Now drill through with a 1/16 in. drill into the ⅛ in. hole. Remove the parts from the block and slip a short 1/16 in. rivet down into the hole to locate the two parts together. Replace the parts and clamp, this time on the rivet head, and drill the other hole. Separate the parts, clean up thoroughly, apply Easiflo flux, drive in a couple of 1/16 in. MS pins and silver solder the two parts together. After pickling, grip in a small machine vice and pass a ⅛ in. drill down through the hole to clear away the ends of the pins and then open up to No. 20 and tap 3/16 in. x 40 tpi.

Note that the shoulder on the screw (4) is cut back at an angle to seat into the bottom of the ⅜ in. hole. To prevent the knurled knob (8) from unscrewing in use, the screw and knob were assembled with a thin paper washer between the knob and the body to provide a working clearance on the finished assembly. After the knob was well tightened, a No. 54 hole was drilled into the knob far enough to enter the screw for a short distance. The hole in the knob was tapped 10 BA and fitted with a grub screw (see 8). It remains only to make the undercut on the clamp and then clean up all over. Break all sharp edges but don't overdo this, the little chamfers should not be more than about 15 thou wide. Use a *fine* file and finish by stroking *along* the edges, not across them.

This holder can be used with any normal type of rule up to the fairly heavy ones supplied with M & W, and similar, combination sets. I use mine always with a 6 in. rule because I generally use a height gauge for any work outside the scope of the small scriber, and 6 in. rules are not so easily knocked over as 12 inch. One can, of course, quite readily increase the range of the little scriber by standing it on a pair of 1 in. parallels or by building it up on blocks which are of a known nominal height.

There can be no doubt that this little outfit is

quicker in use than a height gauge provided one is working in millimetres or inch fractions not smaller than 1/32 in. — the limitation is purely one of sight. One hears and feels the scriber point dropping into the graduation but, with 64ths, I find it difficult to select the right one. It has one advantage over a height gauge in that the scribed line is a groove with symmetrical sides whereas a height gauge makes a one-sided groove and punch-pricks, however fine, are almost certain to be off to one side (see Fig. 2, 3). Perhaps this is splitting infinitesimal hairs but for anyone trying to get things *right*, no hairs are too fine to be split!

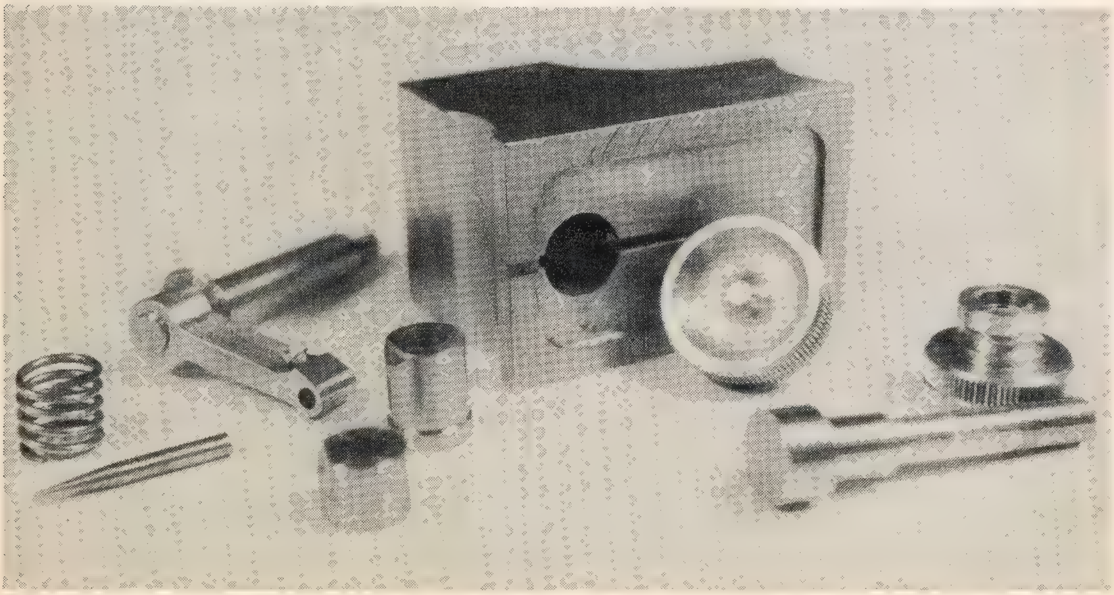
I have carried out some simple tests by scribing a short line on a piece of material exactly .500 in. thick, the scriber having been set into the ¼ in. grad on the rule. The material was then turned over and another line scribed to meet the first one. Under magnification the result left nothing to be desired, the lines met end on end which was a proof of the excellence of the rule.

Hones

Having had occasion to mention the use of "India" stones several times and realising that many readers have no proper means of keeping their tools in good condition, I feel that a few words on the subject might be appreciated. There are two principal makes of artificial oilstones; "Carborundum", which consist of the abrasive silicon carbide and is dark grey in colour, and "India" (Norton Abrasive Co.) of which the "fine" and "medium" grades are brick-red when new, and the "coarse" which is usually brownish grey in colour. It is my experience that carborundum stones might cut a little faster but they wear very rapidly and lose their shape whereas "India" hold up much better. When a stone becomes grooved or hollowed it is practically useless for honing the flat surfaces of turning tools so it pays to use different parts of the surface of the stone rather than to stick to a favourite patch. "India" stones are available in a great variety of sizes and shapes and while many of these might be useful on occasion, the two which I regard as essential are 4 in. x 1 in. x ½ in. medium and fine grades. A medium grade 8 in. x 2 in. x 1 in., for which a nice fitting wooden box with lid should be made, is a very useful size also but the two smaller ones are the most important. If your tool-shop hasn't the right kind in stock don't be put off with something else "just as good" — it isn't!

Use a thin oil (Vitrea 27, as used on the lathe) or paraffin on these stones and try to ensure that the oil used will not oxidise readily. I mention this because one common brand of light oil appears to oxidise on exposure to the air leaving a residue of "varnish" which would ruin an oilstone. Keep it for bicycles and prams — but not sewing machines or oilstones! Some people keep their small stones standing on end in a jar of paraffin which helps to keep them clean and free-cutting.

For honing turning tools the stones can rest on the bench and the flat to be treated settled down on to it. I frequently hold the stone in my left hand and the tool in my right with the forefinger pressing hard on the tool immediately above the area to be honed. The object is to guard against rocking the tool which would round the face and destroy the cutting angles. I *never* attempt to hone a tool (referred to as "touching up") while it is still mounted in the machine; the chances are that it will be worse after than before treatment.



The 5 in. gauge S.15 of Mr. Les Warnett, built by Mr. Les Clark of Horsham.

GREENE KING

A Southern Railway 4-6-0 mixed-traffic locomotive for 3½ in. gauge

by Martin Evans

Part XIV

From page 772

MAINLY for beginners' benefit, I am showing a pipe diagram for *Greene King,* to show where the various feed water pipes start and finish, though the exact "run" of the pipes is best decided on the job itself. Actually the pipework on this locomotive is extremely simple: one 5/32 in. dia. pipe to carry the water from the tender to each injector, one from each injector steam valve to each injector, and one from the left-hand injector to the left-hand clack. The pipe conveying the water from the emergency hand pump in the tender joins the delivery pipe from the right-hand injector at an angle, as shown.

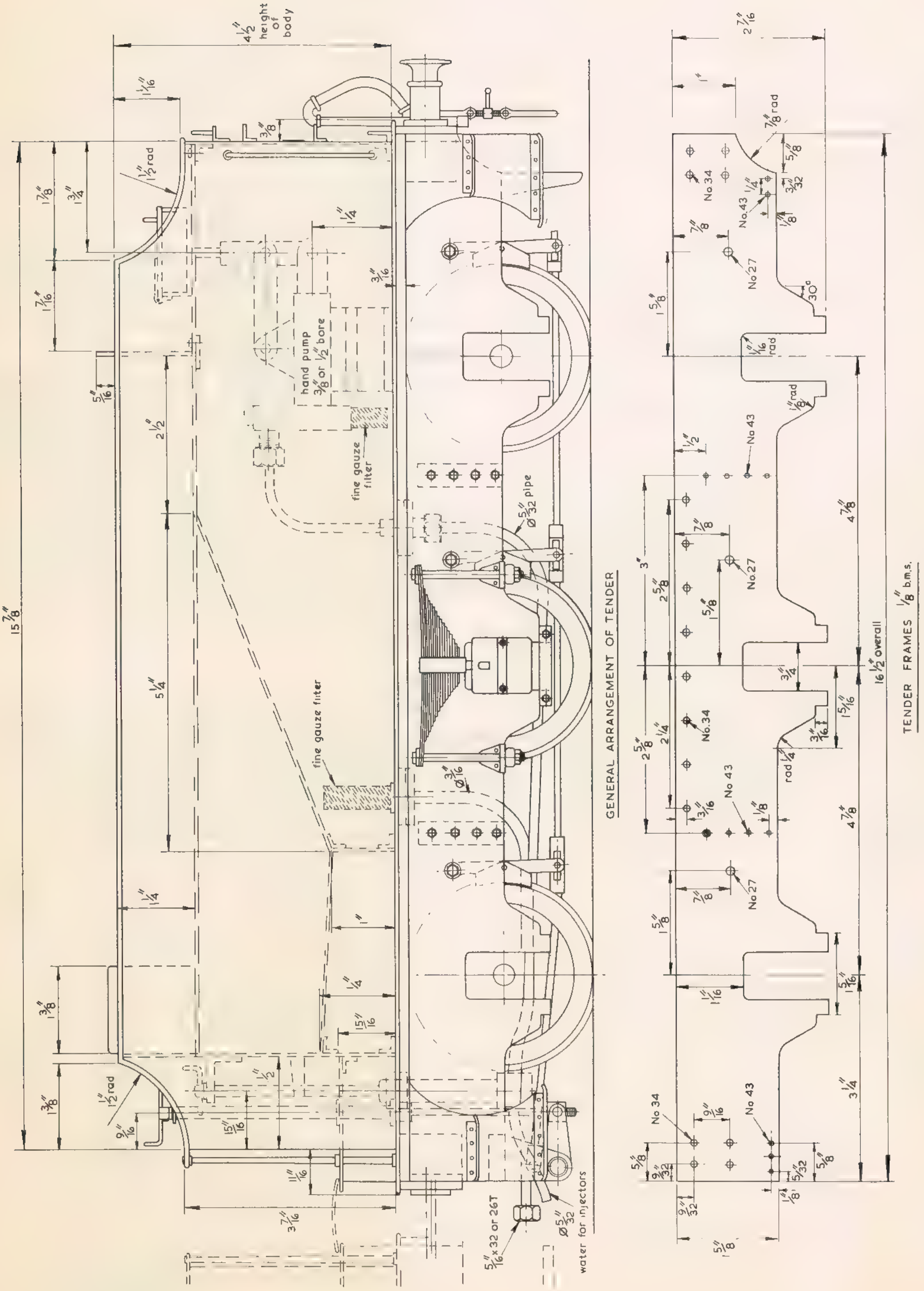
Readers may query this arrangement; they may think that the water from this injector will not pass up to the clack in a steady stream, but will be affected by the hand pump "junction". I don't think this will be so, but it is something that one cannot be sure of until the idea has been tried out. Of course the injector water could be forced back to the hand pump, but as this has a non-return valve and a proper pressure union between engine and tender, I see no trouble here. Similarly, when the hand pump is in use, water which is forced back to the injector will be stopped by the clack on the injector itself, so will feed into the boiler in the usual way.

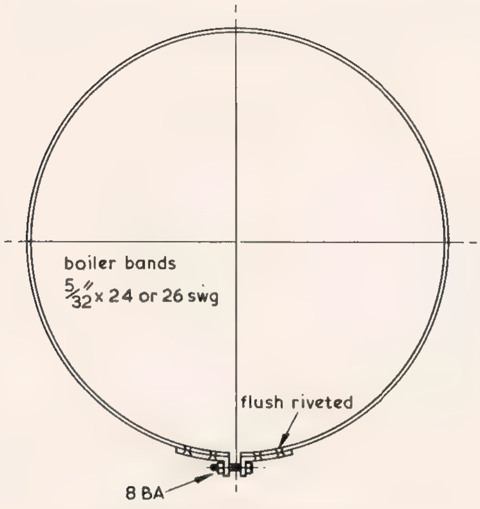
The exact position of the three pipe connections under the engine drag beam should be left until the tender has been built, so that the pipes can be made to line up nicely.

Lagging

Some readers of these notes have complained that I never say anything about lagging and cleading for my locomotives. Well, there is not a great deal that can be said, as lagging is one of these things that are best decided "on the job", rather than working to exact dimensions given on a drawing. However, I hope my little sketch will prove of some help.

I think lagging and cleading is essential on any locomotive of 3/4 in. scale or larger, not so much for the insulating effect, which is probably very slight anyway, but to provide something to which


GENERAL ARRANGEMENT OF TENDER
TENDER FRAMES 1/8" b.m.s.
hand pump 3/8" or 1/2" bore
fine gauze filter
fine gauze filter
water for injectors
16 1/2" overall
4 1/2" height of body



DETAILS OF BOILER BANDS

the handrail knobs and other details can be attached, rather than drilling holes in the boiler. If it should be said that the fitting of lagging and cleading means a much oversize boiler or alternately a barrel considerably under scale diameter in order to keep the outside diameter to scale, then I would be quite happy to put up with the under scale barrel!

In the case of *Greene King,* we can take advantage of the firebox wrapper being outside the barrel to achieve the slight taper of the boiler on the full-size locomotive. The lagging could be carried out using 1/32 in. Walkerite or Hallite sheet, the front section being one layer thick, the middle section two layers, and the rear, firebox, section one layer. The cleading, 26 s.w.g. hard brass sheet, is then made in two sections, the break being located just in front of the front edge of the firebox wrapper, the join being covered by one of the boiler bands. The boiler bands should be 5/32 in. x 26 s.w.g. to be reasonably close to scale, and can be in any suitable metal such as brass, phos-bronze or even stainless steel. To stiffen up the ends, where they are bolted together underneath the barrel, short lengths of strip slightly thicker than the bands themselves, are riveted on, the rivets being countersunk and filed flush both sides. 8 BA steel hex. screws are used to pull the boiler bands tight.

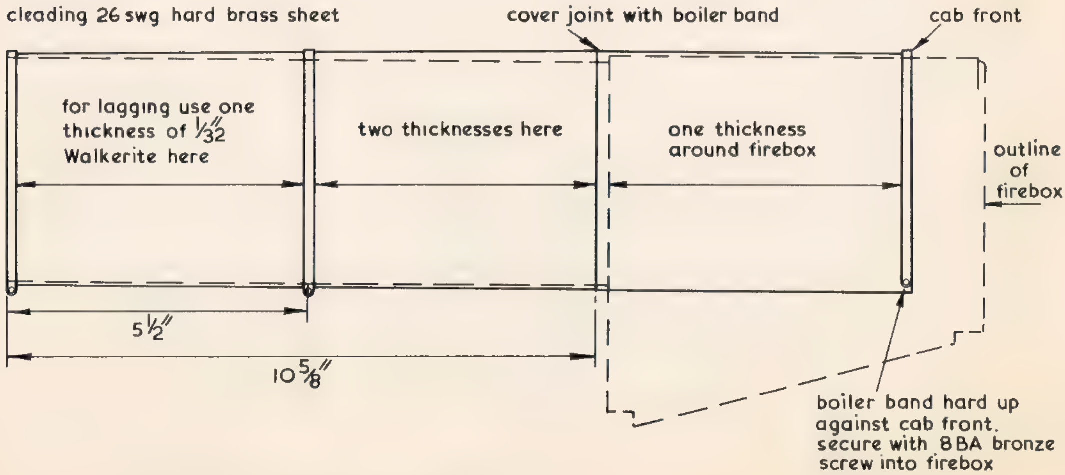
To hold the cleading material closely around the firebox, it will be necessary to drill and tap 8 BA in the outer firebox wrapper, just above running board level, but if a bronze screw is made for this, and plumbers' jointing used on the thread, there should be no trouble from leakage.

To fit the handrails, the lagging and cleading should be fitted completely, then a scribing block can be used to mark out the line of the handrails, after which the cleading sheets can be carefully removed for drilling, thin nuts being used on the inside, to hold the handrail knobs firmly.

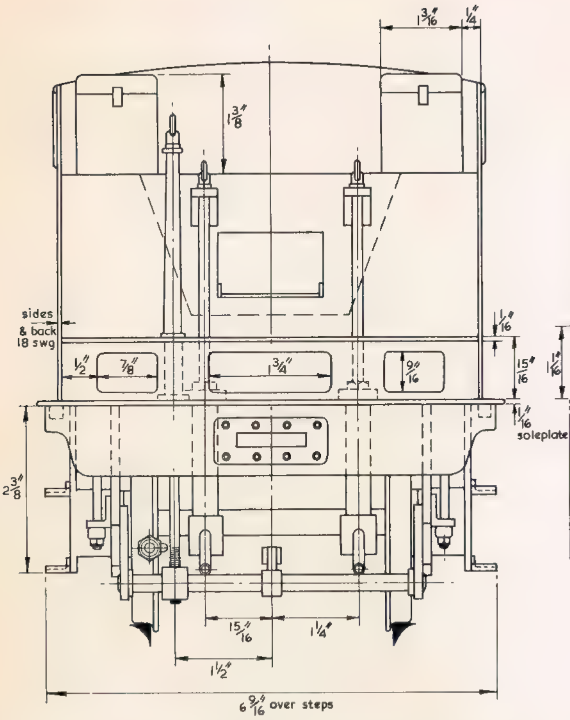
An "organ pipe" type of whistle can be made up to complete the fittings on the engine; this can be slung cross-wise underneath the cab footplate, at such an angle that any condensed water will run out of the air slot.

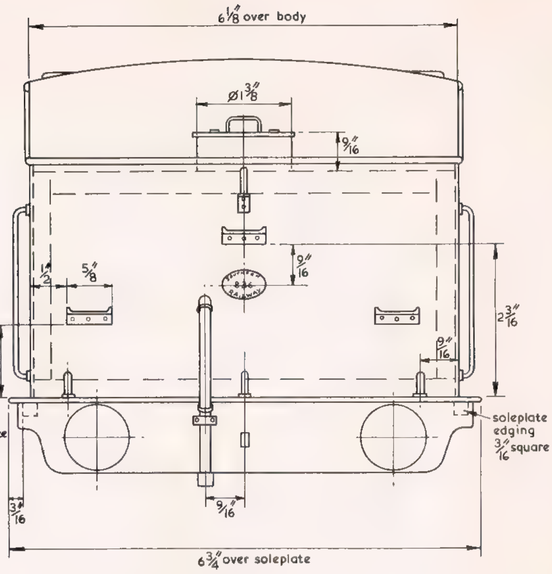
Tenders

When first built, the S.15 4-6-0s were supplied with the Urie bogie tenders, the later Maunsell (Southern Railway) engines having the very similar Maunsell bogie tenders. However, a few of the Maunsell engines received standard six-wheel tenders for a time, so it would not be incorrect if buil-



DETAILS OF LAGGING & CLEADING



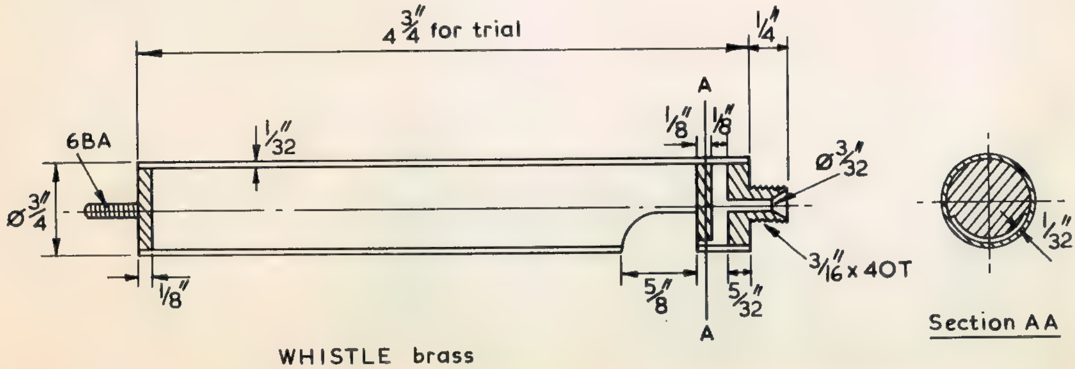


ders preferred to make the six-wheeler. The bogie tenders would make firing very difficult, especially on the run. My drawing shows the six-wheel tender, exact to scale in side elevation, though slightly wider, in order to match the width of the engine cab. It is an easy tender to make (especially after that awkward *Evening Star* tender) as the sides and ends of the body are quite flat, and there is only a small radius at the corners.

To avoid having to cut slots in the tender soleplate (floor), I have shown the wheels slightly smaller than the correct scale size, but I don't suppose many builders will object to this. They should have ten spokes.

The frames are cut from 1/8 in. b.m.s. and are held at each end by 3/4 in. x 3/4 in. x 1/8 in. steel angle, riveted in turn to the buffer and drag beams, which are cut from 1 in. steel angle. Two cross stretchers, castings in gunmetal or iron (details next time) make the whole structure very rigid.

The tender body is built up on the soleplate, which is 1/16 in. hard brass. Note that the corners should be slightly radiused (about 1/16 in. radius). The sides and back, the top plate and the sloping coal plate are all cut from 18 s.w.g. brass, while the front plate, to which the injector water valves are bracketed, is made from the 1/16 in. plate. The body is built up in the usual way, using 1/4 in. brass



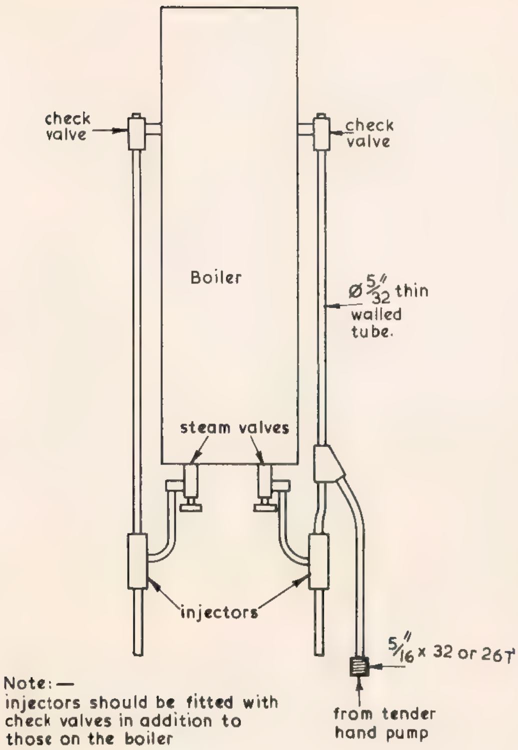


DIAGRAM OF PIPE LAYOUT

angle, and 1/16 in. rivets countersunk on the outside. The whole of the inside of the water space can either be run over with soft solder, or one of the modern adhesives such as Araldite may be used. In either case, it is not a bad plan to paint the whole of the inside of the water space flat white oil-based or cellulose paint, as this shows up any "foreign bodies" that may find their way inside.

The top plate or deck is made as a separate piece, ending at the transverse coal division plate, so that it can be quickly removed to give access to the emergency hand pump. I feel that this is a better idea than cutting a long narrow slot through which the extension handle is placed when it is required to use the pump. Such a slot looks bad and can also be the reason why dirt and grit tend to find their way into the tank.

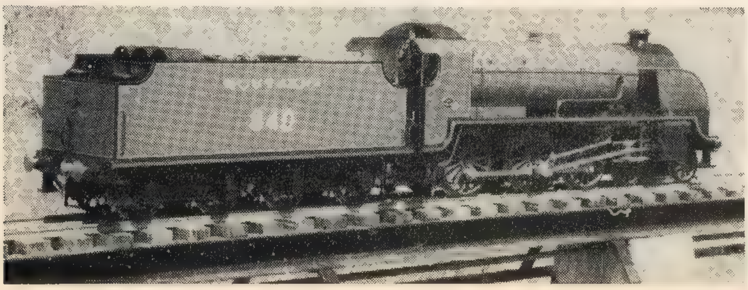
Any standard type of tender hand pump should be suitable, 3/8 in. or 1/2 in. bore, but note that it is placed unusually high, and not bolted directly to the soleplate; this is to reduce the swing of the extension handle. This can be achieved quite easily by using a pair of heavy brass angles, 3/4 or 1 in., according to the pump in use.

The soleplate can be held down to the frames by a single 4 BA screw in each corner, into tapped holes in the drag beam, but at the rear, the screws should be put in from the inside, with the heads soft soldered, nuts being put on underneath, so as to keep the tank water-tight.

These Southern tenders did not have water pick-up apparatus, so there was only one standard and handle — for the brakes. On our model, this is placed as far over to the right as possible, so that plenty of room is available for the two standards which serve as injector water valves. The brake standard shown is actually to "scale" height. But for a purely working model, it might be better to shorten this considerably, until the handle is below the level of the handles of the water valves, rather than above them, so that operation of the injector water valves is in no way hindered.

I am writing these notes just after returning from IMLEC at Guildford. It seems that some competitors thought the coal rather troublesome, being in fact anthracite rather than Welsh steam coal. It may be that now that Welsh steam coal is becoming increasingly difficult to obtain, we shall have to decrease the size of our blast nozzles to cope with the harder fuel. Generally speaking, anthracite needs a much stronger blast to get the best out of it than Welsh steam coal. Talking of IMLEC I think many visitors must have been very disappointed at the performance of the G.W.R. "Manor" class locomotive — a beautiful looking engine. Something obviously went very wrong, as I understand that the engine performs in great style on her home track. We will have to read Laurie Lawrence's full report to find out exactly what the trouble was. On the other hand, I am sure that everyone was delighted with the fine run by Bert Perryman's "Gladstone".

To be concluded

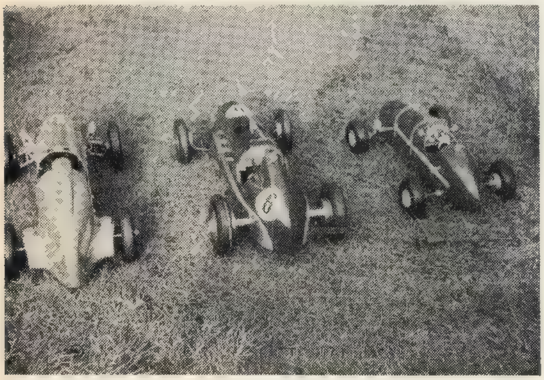


Another view of Mr. Warnett's 5 in. gauge S.15.

Club Chat... with the Editor

At Harlington on 10 September there is an Open Day by the **Harlington Locomotive Society** and the club has taken the opportunity to include an exhibition of members' work. There are three sections: finished locos; part-finished locos; and general engineering and modelling. There will be a "prominent member of the model engineering fraternity" present to judge the exhibits and make the awards at the end of the day. Visitors should note that the opening times are from 12.00 to 18.00. The club also has a public open day on 24 September from 14.00 to 18.00. The club's address is High Street, Harlington.

I noticed in the **North London S.M.E.** News Sheet that at one of their meetings "it did not appear . . . there was any general wish for the revival of the diesel cars". Tom Pinnock, who wrote the article concerned, stated that although he, personally, would like to see and smell them again, he did not think that nostalgia is a good enough reason for their resurrection. I think I would disagree with him there. If there was not a lot of nostalgia in model engineering, many of the loco chaps would be running diesel electrics instead of steam. If the interest is not there then that is another matter and, I believe, a great pity. It is encouraging to note that other people are not of the same mind and Geoff Shepherd of Bristol, who is well known in, among other things, car racing circles, told me the other day that the organisers at Pontins, Brean Sands, hope to use the tennis courts as a circuit for some tether racing in October. If the car chaps of a few years back would like a small piece of nostalgia, then take a look at these old favourites by Mr. Wortly of Great Yarmouth. Car racing does not necessarily mean the modern projectiles which we associate with speeds approaching 200 m.p.h. They are the result of many years' development.



Those in this photo are scale models of the Vanwall era, when Coopers, Ferraris, etc. graced all the circuits. I even had a Masco Kitten myself with a Mills 1.3 cc. diesel. And I bet there are not many of those around now. However, back to North London where there will be a firework display on 11 November — are we talking about winter already? — at the Colney Heath site. The match will be struck at 7.45 p.m. and admission tickets cost £1.50.

An unusual talk was made to the **Andover & District M.E.S.** recently by Mr. G. C. Backinsell, C.Eng., F.I.Mech.E., on the history and workings of the medieval clock in Salisbury Cathedral, the oldest working clock in the world — no, it isn't run on steam. Then, on 28 June, Mr. Backinsell took the club members on a conducted tour of the clock, Cathedral spire and bell tower which has aroused interest in this type of architecture. Mr. Backinsell has offered through Mr. R. S. Hammond, Hon. Sec. of Andover club, his services to any Society on this subject. He may be contacted at "Woodlands", The Street, Farley, Salisbury, SP1 AB. That address is Mr. Backinsell's, by the way.

The portable track at **King's Lynn** has been well-used this year and at Gaywood Church Fete on 24 June it collected £17. It was also in use at the Grammar School on 8 July and Reffley School on 15 July. The Hon. Sec., Mr. H. B. Mallett, 60 Station Road, Clenchwarton, King's Lynn, says that it is in need of a re-paint — I'm not surprised. King's Lynn club are planning a model exhibition for early 1979; more details will follow when we have them.

At **North-West Leics. M.E.S.** the open week-end on 24/25 June turned out to be successful despite the efforts of the weather to put a damper on things. Fourteen locos turned up and a full-size Burrell T.E. attended. Mr. D. Hill, Hon. Sec., wishes to thank all those who supported the event.

Mr. M. P. F. Hallows, Publicity Officer of the **Leeds and District Traction Engine Club,** has told us that the annual Traction Engine Rally will be held at Bramham Park on 26-28 August. Bramham Park is on the A1 south of Wetherby, the gates open at 11.00 and events begin at 2 p.m.; car parking is free but admission for adults is £1 with two accompanied children admitted free. All the usual attractions will be there including steam engines, fair, vintage vehicles, model engineering, horse carriages, etc. On Saturday there will be a collectors' auction by Central Motor Auctions. Mr. Hallows can be found at 17 Woodhall Park Grove, Pudsey, West Yorkshire. His telephone number is Pudsey 572194.

Here is a change of secretary, this time at the **Tramway & Light Railway Society.** The new man is Mr. H. J. Leach, 6 The Woodlands, Brightlingsea, Colchester, Essex.

Someone believes in going to have a look for himself. I refer to Mr. S. Topping, Chairman of **The Model Engineers Society N.I.,** who is off on a six-week vacation to the U.S.A. His destination is the area of Oskosh, Wisconsin, which is a railway centre near Milwaukee. He has promised the club filmed reports of what he finds there. At Cultra the extension should now be complete and for July and August the Friday evening club meetings have been suspended so that trackside meetings on Saturdays can take place. The next club meeting will be the first Friday in September.

Slipping back to Leeds for a moment, I am pleased to note that the **City of Leeds S.M.E.E.** have found somewhere to re-lay the raised track which has suffered considerably over recent months from vandalism at the Temple Newsam site. The track will now be at Eggborough Power Station on the A19 south of Selby where the Egg-

borough Railway Society — a sub-section of the Power Station Sports & Social Club — has already acquired the 4 ft. 8½ in. tracks of the site for use with a small tank loco when it can find one. City of Leeds club are going to lay their 1038 ft. raised 3½/5 in. track on Sunday mornings so no doubt help will be appreciated. The only snag at present is that access to the site is restricted to club members due to security but rally days and club visiting can be arranged when the laying is complete. The Hon. Sec. at Leeds is David Beale, 4 Lime Tree Close, Thorpe Willoughby, Selby, N. Yorks. YO8 9PH. Telephone number is Selby 4778.

If it isn't vandalism it's the weather making life difficult. This photo shows the damage done to the extension at present being built at **Warrington M.E.S.** when a tree was blown down in a gale recently. Mr. H. Kettle of Elton, Chester, sent us the photo. And still in that area, don't forget the Annual Open Day of Crewe M.E.S. on 22-24 September in the Club Room, 29 Mill Street, Crewe. The Hon. Sec. is Mr. R. A. Hawkesford of 82 Meredith Street, Crewe, Cheshire CW1 2PN. Note the change of address.

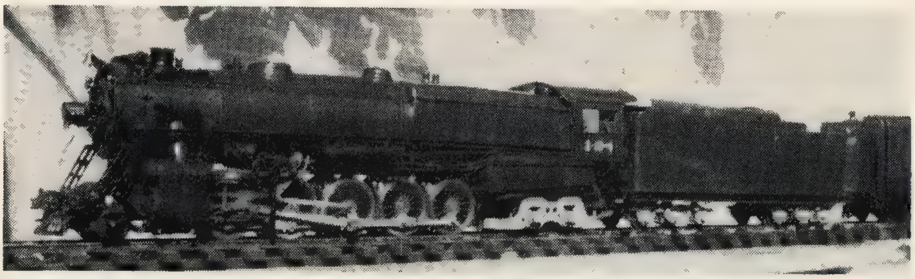
In April the **Australian Miniature Locomotive Efficiency**

Trials were held at Sydney and John Lyons of Sydney Live Steam Locomotive Society has promised us a full report with pictures. I won't make much comment at this stage except to say that the winner, Ross Style, pulling 3714 lb. behind his L.B.S.C.R. Atlantic 5 in. gauge loco, used 2.75 lb. of coal, making him the winner with 2.046 per cent. Congratulations to Ross.

Big Wheel News, journal of **The Steam Locomotive Society of Victoria,** edited by Bert Kirby (see "Smoke Rings"), carries more reports on the Easter Convention held at Queensland S.M.E.E. and it is interesting to note that the track there is 1800 ft. of 5/7¼ in. gauge and has a trestle bridge some 7-10 ft. high by 100 ft. long. The area sounds delightful except for the mosquitoes which were kept at bay by repellant. This track is of course ground level but inside it is a 3½/5 in. raised track. For the Convention, 43 locos turned up with 220 people on the busiest day. On 16 April, the Victoria club held a charity run and presented $364 to the Multiple Sclerosis Society of Victoria. Twenty-five locos turned up for this.

The May meeting of **The Otago M.E.S. Inc.** was spent looking at Omega Centauri and Saturn. No, these are not locos but the real things up there in our solar system which the club viewed through a 30 cm. telescope. That is an interesting deviation from normal club activities. The club has just completed a new club lounge and storage facilities, so with the improved toilet and a shower installed it sounds an ideal venue. The June issue of *Con-Rod* contains results of the Steam Trials at Blenheim on 25/26 March. Here they use a points system to measure efficiency and first place went to Mr. J. Shipman with a 5 in. gauge "Simplex", one of only three 5 in. locos in 12 competitors. Six were 3½ in. and three were 2½ in.

In the 21 July issue report on the new track at **Colchester S.M.E.E.,** I stated that the ground level 7¼ in. track has been completely renewed. Unfortunately, I over-estimated the speed of work of even the Colchester club as the 7¼/5 in. track is a long way from being completed as yet. Thanks to Colchester President Philip Andrews for putting the record straight.



These photos show two 2½ in. gauge locomotives of Mr. Ken Finlay of Melbourne, Australia. Above is a 2-10-4 Canadian National "Selkirk" and below a Norfolk and Western 2-6-6-4 Mallett. These are two of Mr. Finlay's locomotives, which include a "Big Boy" with steam reverse. All the locos have bar frames of ¼ in. × 1½ in. mild steel. The track is one of the oldest in Australia as Mr. Finlay tells us that it was first put down in 1920.

Post Bag

The Editor welcomes letters for these columns. Pictures, especially of models, are also welcomed. Letters may be condensed or edited.

2½ in. gauge

SIR, — May I introduce myself as a Model Engineer, as a reader of your magazine with a particular interest in 2½ in. gauge.

I have just completed a GWR 43XX 2½ in. gauge locomotive as per attached photograph.

The loco is based on my own design using an outline sketch with leading dimensions (obtained from a library book) and photographs of the original "shedded" at Didcot.

The loco is coal fired and fitted with a live steam injector. The valve gear is inside Stephenson and the cylinders are piston valved.

I have incorporated in my design one or two deviations from normal practice. The boiler is round topped, using the cleading sheet to give the correct appearance. The reason for this was that this is only the second boiler I have made and at the time of design, the thought of a tapered boiler with a Belpaire box was rather frightening. However, a basic tube opened out for the firebox has a high inherent strength and the deficiency in the boiler was made up by cutting the frames around the firebox area and widening the grate.

It was noticed during initial test that the basic problem was not producing power but keeping the power on the track, without slip. A great deal of thought went into this problem. It was noticed that the engine was very front end heavy due to the cylinders and smokebox saddle castings and therefore it was the front wheels that were doing most of the work. The obvious answer was to balance the engine on its centre driving wheel. The bogie is just a dummy taking no engine weight at all.

The balancing was achieved by adding lead to the sides of the cab, between the lagging and cleading sheet on top of the firebox under the cab floor between the frames and under the running boards to the rear of the driving wheel. In all, approximately 6-7 lb. of lead has been added.

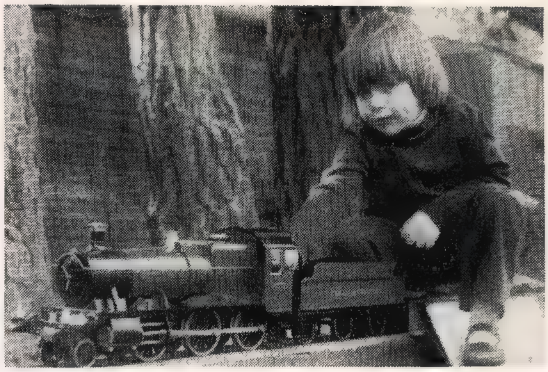
This resulted in an engine balanced about its centre driving wheel so that all 6-coupled wheels equally share the engine load.

The effect of this was quite remarkable and now the safety valve has been wound down to maximum working pressure 100 PSI to take advantage of the increase in adhesion. The engine weight (working) is approximately 26½ lb.

Technical details of the locomotive are as follows:

Maximum working pressure	—	100 PSI
Heating surface area	—	120 sq. in.
Super heat surface area	—	8 sq. in.
Grate area	—	6.5 sq. in.
Cylinder size	—	2 x .75 in. dia. x 1.25 in. stroke
Coupled wheel dia.	—	2.75 in. dia.
No. of cylinders	—	2
Piston valve dia.	—	.312 in.

Tests have shown the boiler steaming capabilities are very good. The water space is rather narrow but I believe quite manageable (contrary to popular belief). The locomotive took approximately 1200 hours to build and about 200 hours to design and draw.



This is my first serious attempt to build a locomotive and I am greatly indebted to *Model Engineer* for its practical help and to my colleagues in the Reading Society of Model Engineers.

I feel it is a great shame that 2½ in. gauge has lost national interest.

It was interesting to note, the other week when I took my loco to the Reading Society for boiler testing, certain members could not believe that it was a 2½ in. gauge loco. It seems their opinion of 2½ in. gauge is of a "toy".

It would be very nice to see a good 2½ in. gauge loco serialised in *Model Engineer*. 2½ in. gauge locos are great fun to drive, they do not need a large load to make them steam correctly, they are relatively cheap to build and they are easy to handle (no broken backs!).

Reading, Berks — David Burton

A report on the National 2½ in. Gauge Association Rally at Colchester on 30 July will be published shortly.–Ed.

Meccano

SIR, — I was interested to see the letters about the Meccano system for model building in *Model Engineer*, as I have been a keen advocate of it since I got my first set as a boy and had it added to every Christmas. Mr. Blackburn is so right when he says it taught one simple engineering facts. The side thrust of worm-gearing, and the benefits of lubrication, being but two of them.

Meccano could reproduce almost every full-scale principle except the sliding gearbox pinion and was thus used for serious purposes, the most recent of which I have seen referred to being the use of Meccano by Ladybird for designing their clothing machines. There was, in my opinion, nothing comparable; and I remember Cliptico as another of the alternatives mentioned by Mr. Evans as trying to rival Meccano. It is nice to know that Meccano and the *Meccano Magazine* have survived to the present-day.

Mr. Blackburn says he wishes he had one of the old Meccano "K" miniature oil-cans. I believe something similar, a 1/8 pint "Midget" oil-can, is still made by Sutcliffe Pressings Ltd., Horsforth, Leeds. I have no connection with them so I do not know the price. Did they, perhaps, supply Meccano Ltd. originally?

Nantmel, Powys. — W. Boddy

Narrow gauge

SIR, — I am very interested in the possibility of modelling one of the narrow gauge railways of Derbyshire — the Ashover Light Railway, the Leek and Manifold Valley Light Railway, the Crich mineral tramways and the Duffield Bank 15 in. gauge line. (I do know about Ella). I would appreciate anyone who has any full size or model drawings of any of these locos getting in touch with me.

Swanwick, Derbyshire. — G. Garrett

Reversing Gear

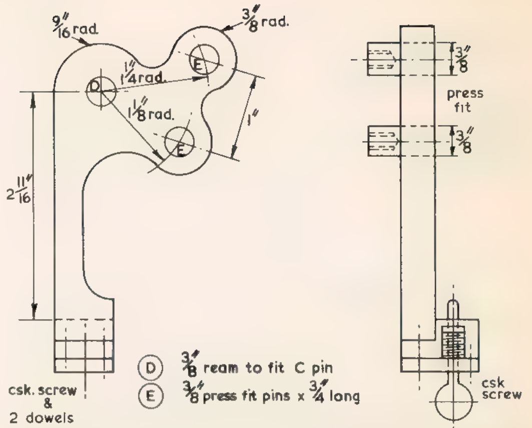
SIR, — The lack of tumbler reversing gear on my new M.L.10 lathe I felt needed remedying, so I set about making my own. I thought other *M.E.* owners of this machine might be interested — if they haven't already beaten me to it!

The main plate ⅜ in. thick A1. alloy plate 5¼ x 3¼ in. the shape of which is not critical providing it accommodates the three holes A-B-C at dimensions indicated.

To attach the plate to the lathe I made use of the gear cover square peg, turning it back a further ½ in. This is to go through hole "A". Hole "B" lines up with the slot at rear of machine which is intended for the reversing gear re "Myford method". Make it slotted so that gear meshing with headstock gear can be facilitated, then fix with suitable bolt and nut. A distance piece about ¼ in. thick will be required between plate and slot face.

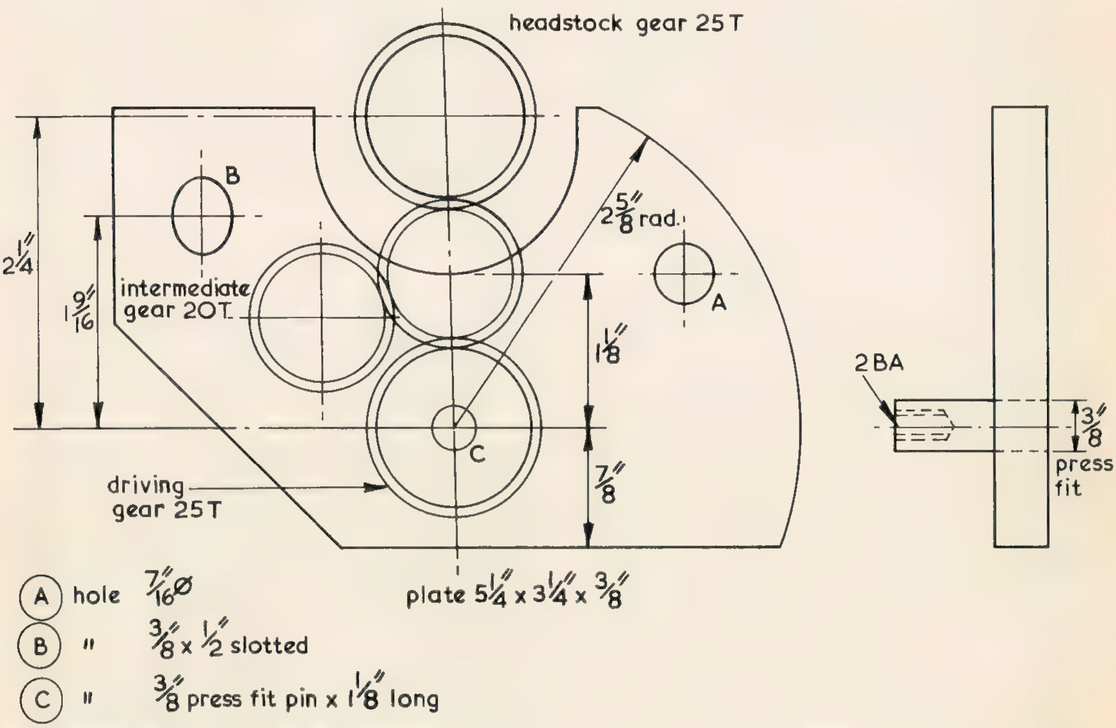
"C" is a fixed ⅜ in. dia. pin on which the tumbler carrier is pivoted, also on which the final drive gear is mounted.

Two 20T spur gears are the only extra ones needed, the two 25T being among the set supplied with the machine. The gear cover will need to have a cut-out made to clear the tumbler carrier handle over its full movement.



I think the illustrations and basic dimensions coupled with a model engineer's "savvy" are sufficient to make a useful addition to your M.L.10.

Carshalton. A. F. Singleton



Britannia slip

SIR, — After having some difficulty in controlling slip on my 3½ in. gauge Britannia I tried the effect of blanking off the pilot port in the regulator. The next track test appeared to show that one port only could pass sufficient steam. The only available load was the equivalent of four 12 stone men, and the loco handled this with plenty of power in hand. The regulator still needed careful handling.

Another point, it is easier to assemble the valves if they are made in two parts, the lower stem and button being in the form of a plain shank cheese head screw, with 8 BA thread.

For a number of years in the 20s and early 30s, I lived at one of the M.W.B.s pumping stations. The pumping engine was at that time a modern marine type compound with Corliss valve gear, the pumps were driven from the crossheads via rocking beams.

Occasionally the trip gear would fail to operate. As can be imagined, the result was that the engine raced from its normal 12 strokes per minute, flooding the engine room in the process, as the water could not flow away fast enough.

As far as I know the cause of the malfunction was never discovered.

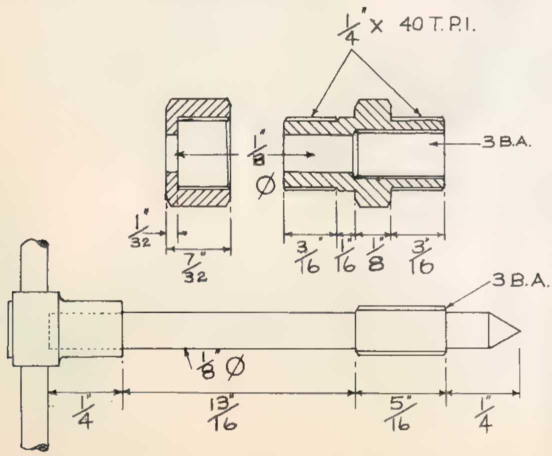
Enfield, Middx. P. A. Wood

Steam Crane

SIR,—In issue No. 3557 there appears a design for a crane by "Tubal Cain". The steam stop valve for this is based on the standard arrangement used by LBSC. Now, these valves are safe in the hands of an adult, but unfortunately, this cannot be said of them when they are used by a child. The reason for this is that the spindle can be completely unscrewed from the valve, and the "boys, being boys" always have to seek the ultimate. An author writing under the pseudonym of "7007" in the Journal of the Society of Model & Experimental Engineers some years ago drew attention to this and suggested a design for a "small boy proof" valve featuring a captive spindle. Drawing on this author's precepts, I have taken the liberty of redesigning the crane stop valve to obviate this risk and the sketch shows the modest alterations to the existing parts required to achieve the desired end. It will be seen that the valve stem, of necessity, has to be smaller than the minimum diameter of the thread, otherwise assembly into the gland would be impossible. If we use the original 5/32 in. x 32 t.p.i., this would reduce the stem to 3/32 in. dia. which is rather slender. If, on the other hand, we increase the thread to 3/16 in. x 32 t.p.i. we encroach to within a wall thickness of .015 in. to the minimum diameter of the male thread on the gland, which is too close for comfort and would probably lead to the gland neck being wrung on tightening into the body. The best compromise I can find between those conflicting requirements is the 3 BA thread shown. This gives a spindle diameter of $\frac{1}{8}$ in. and a wall thickness of .025 in. It is a pity it has to be 3 BA as screw-cutting of the spindle thread makes for a better job, but the use of a good quality die held in the tailstock die holder is the next best alternative.

In order to enable the gland and gland nut to be assembled onto the valve spindle, it is necessary to provide an operating handle which can be assembled as a final operation. This is normally done by the provision of a square shank and a retaining nut but this is hardly justified in the present case and I suggest we resort to the use of that excellent product, Loctite. As the valve stem and handle are in stainless steel, it will be necessary to use the primer, Locquic T, followed by the high-strength grade, Loctite 75. After half an hour in the oven at the lowest Regulo setting, security will be assured. Subsequent dismantling is possible at 200°C.

Assembly of the gland nut into the valve body should be tight enough to ensure that young fingers will not be able to unscrew these parts in an endeavour to get "more revs". Provision of three complete turns of the valve should ensure an opening commensurate with the cross-sectional areas of the remaining parts of the valve and plumbing.



Hampton Hill, Middx. H. W. Holmes

"Tubal Cain" writes: Mr. Holmes has a valid point, and his design of valve is an improvement. The only point to note is that the gland-nut must be assembled on the spindle BEFORE attaching the handle."

CLAUDE B. REEVE

AN APPRECIATION

I first met Claude Reeve at a Model Engineer Exhibition and this chance meeting ripened into a firm friendship.

It may come as a surprise to some readers to know that before constructing clocks Claude made violins, all of which with customary generosity he gave away. Once he started on clocks, however, they became his great love and with the exception of a telescope he never made anything else.

His output of clocks was immense and in this respect I would like to quote from Roger Collard's book *Skeleton Clocks*. He wrote (of Claude): "An amateur horologist and enthusiast, who has made more than forty complicated clocks for his own edification and use is included in this chapter. All his clocks' movements have been brilliantly executed with traditional craftsmanship and are on a par with any professional. Year clocks, complicated chiming clocks, longcase gravity clocks, even grade sommerie clocks came from his hands." Since this was written of course there have been many more clocks, not all of them publicly shown, including three one-year-going skeleton clocks.

The prodigious number of clocks made was in part due to Mrs. Reeve, as she ran the household so that every minute of Claude's time could be spent in making clocks. She it was who typed his MSS. and entertained the countless visitors who called to see the clocks. I am sure all those who received her hospitality will sympathize with her in her loss.

Until a couple of years ago Claude would make a daily appearance at the Model Engineer Exhibition, there to give freely of his experience to any who cared to ask. Many a clock has been finished because of his sage advice and many a dispirited constructor went home with his problem solved. There was never any unworthy withholding of knowledge he had himself laboriously acquired, such a thought would never have occurred to him, and I and many others have reason to be grateful for his many generous acts.

He loved the annual Model Engineer Exhibition and those who will be saddened by the news of his death may like to know that when I saw him the day before he died, though he looked dreadfully ill and was in great pain, he nevertheless thought he was on the mend and we discussed the clock he intended to show at the next Exhibition.

When a notable man dies phrases about his irreplaceability are frequently expressed, sentiments unhappily seldom borne out by events. In Claude Reeve's case, however, everyone who knew him will agree with me when I say that he will never be replaced. He was a great horologist, a good friend and a decent man.

John B. Eastwood

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Buck & Ryan for lathes and workshop accessories, drilling machines, grinders, electrical tools, surface plates, etc. 101 Tottenham Court Road, London W1. T/C

MODELS & MATERIALS

3½" Tich chassis 50% complete, all parts machined, boiler ready for assembly. Offers: Williams, Tel: Maryport (Cumbria) 4225. V

5" Gauge Stirling Single. Completed boiler, frames and platework. Plans and most castings to complete. £95. Tel: Crowthorne 71778 any time. V

7¼" gauge track, over ¼ mile together with 5 turnouts. Tel: 02273 5029. V

Burrell Traction Engine 4½". Welded steel boiler. Finished in green and maroon. Fitted bolt on rubbers over strakes. Five years old but little used. A well engineered example of this popular model. £4,000. Accessories include 24 volt generator, trailer attachment and wire rope. Export case available (ex Japan Rally 77). Tel: 01-578 0342 after 6 pm. V

Wanted: To complete my Greenly 7¼" King: Cylinder castings, crossheads, slidebars, smokebox door, outside motion plates. Tel: Coventry 62672. V

3½" Rob Roy. A good runner, finished Black, lined and lettered £350. S.A.E. for list of part-built and completed locomotives in 3½", 5" and 7¼" gauge. M.E. Sale & Exchange, 25 Vale Road, Tunbridge Wells, Kent. Tel: 39227. V

Amos and Smith inverted 6 x 6 steam engine. 4 column. 1878. Tel: Watford 26128. VW

Great Western 3½" City 4-4-0 wanted. Condition unimportant. Remington, 45 Penns Lane, Sutton Coldfield. Tel: 021-373 3577. V

Fayette chassis, wheels, cylinders, boiler plates, flue tubes, 5" 0-4-0 chassis wheels, cylinders, castings pump etc. £50. Tel: Wokingham 782228. V

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Wanted: Model Engineer magazines, will buy or swap BYNG live steam locomotive, BYNG electric loco, and 1949 LMS Hornby set 0400 in original box. Ivor. F., Box 11, Doonside, N.S.W. 2767, Australia. V

Wanted: D.A. Russell's S.S.100 1/5 scale car plan. Wortley, 46 Perebrown Avenue, Gt. Yarmouth, Norfolk. V

3½" gauge Rob Roy, all castings machined, boiler (untested), many other components, requires assembling, uncompleted club project – reasonable offer accepted. C.L. Davis, 28 Lanyon Road, Playing Place, Truro, Cornwall. V

Enthusiast having limited workshop requires part finished Tank Locomotive or one needing overhaul. Jubilee/Firefly size. Project to gain experience. Good price paid. Tel: Norwich (0603) 615983. V

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